WESTERN STATES EDITION

DOMESTIC ENGINEERING

Whole No. 742 Chicago and New York, Saturday, March 2, 1907. Vol. XXXVIII No. 9 $1.00 a Year

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NEW HALL OF RECORDS, NEW YORK CITY, N. Y. Horgan & Slattery, Architects. Warmed by 17,000 square feet AMERICAN Radiation, installed by G. A. Suter & Co., New York.

AMERICAN RADIATOR COMPANY

General Offices, 282-284 Michigan Avenue, Chicago.

See Page 233 for Addresses of Sales Branches.

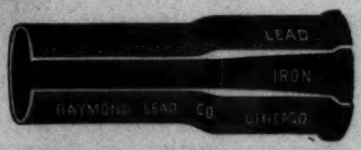
We Have Commenced Suit

Against infringers of our patent supplies

$1,000 Reward

Will be given to any plumber who can prove and convict any one fraudulently using our name on supplies.

Cleveland **GLAUBER BRASS MFG. CO.** Ohio



RELIABLE CONNECTIONS made between Lead and Iron Pipe by using the Raymond Ferrule—the only Lead Ferrule on the market which has an **extra thickness of lead over the shoulder, giving** strength where it is needed and where other lead ferrules are weak. The genuine article bears our label

RAYMOND LEAD CO.

Crosby Spring Seat Globe and Angle **Valves** All Parts Interchangeable. All Parts Removable. Tested for Highest Pressures. **Leak-Proof** CROSBY STEAM GAGE & VALVE CO. Boston New York Chicago

Calor Radiators—Holland Boilers

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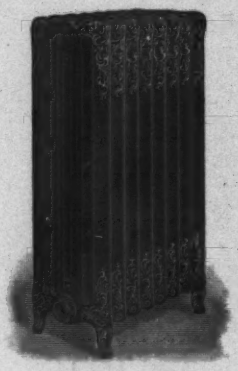
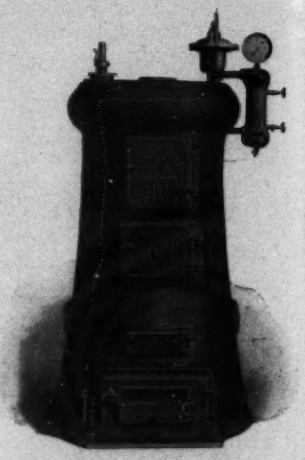


Three Column Steam

They are
the most complete—Up-to-date lines
of

Radiators and Boilers

Shipped from one Plant
Our Location
Insures the quickest delivery in
The Central States
The West and Northwest
The South and Southwest



No. 2250 Steam

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38 DEARBORN STREET, CHICAGO

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TABOR MOLDING MACHINES ARE THE BEST

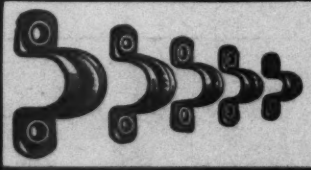
CALL OR WRITE US FOR PARTICULARS

TABOR MFG. CO., - 18th and Hamilton Streets, Philadelphia, Pa.

We make **AIR CELL** Wool Felt and Asbestos Magnesia Sectional Pipe Coverings

High Quality Low Discounts

NATIONAL AIR CELL COVERING CO., 70-78 Third St., S. Brooklyn, N.Y.



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Complete stock of every size and kind. Quality the best that can be made. B. B. Ornamental Pipe Straps, all even clean cut, brightly tinned. Ask for Catalogue and Prices.

Berger Bros. Co., 231-237 Arch Street, Philadelphia, Pa.

REGULATORS
STEAM
WATER

ROSS VALVE CO.

TROY, N. Y.

INDEX TO ADVERTISEMENTS ON PAGE XXVI

DRAINAGE FITTINGS

We manufacture and carry in stock at Chicago and our branch houses throughout the country, a complete line of black and galvanized drainage fittings. Any size and style, in any quantity, can be furnished promptly.

Crane fittings are made with a shoulder, and are of the same inside diameter as pipe. The pipe screws in up to the shoulder, making a continuous passage and leaving no pockets for solid matter to lodge in.

We have exceptional facilities for furnishing galvanized drainage fittings promptly. The work of our galvanizing department is of a very high character, and our galvanized fittings are unequaled.

Malleable Iron Drainage Fittings, made from regular patterns, can be furnished in any quantity on short notice.

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NEW YORK
PHILADELPHIA
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GURNEY

HOT WATER HEATERS, STEAM BOILERS, RADIATORS

THEY GIVE COMPLETE SATISFACTION

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GURNEY HEATER MFG. CO.,

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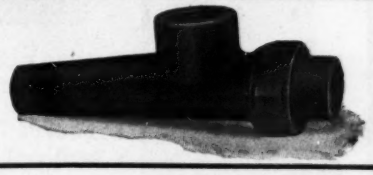
"FLAGG" Malleable Fittings

"FLAGG" Water Back Tee



PIPE FITTINGS AND VALVES

TRADE MARK JOHN SIMMONS CO. TRADE MARK

110 CENTRE STREET, WHEN WRITING MENTION DEPT. D.E. NEW YORK.

SPECIAL RECESSED FITTINGS

FOR

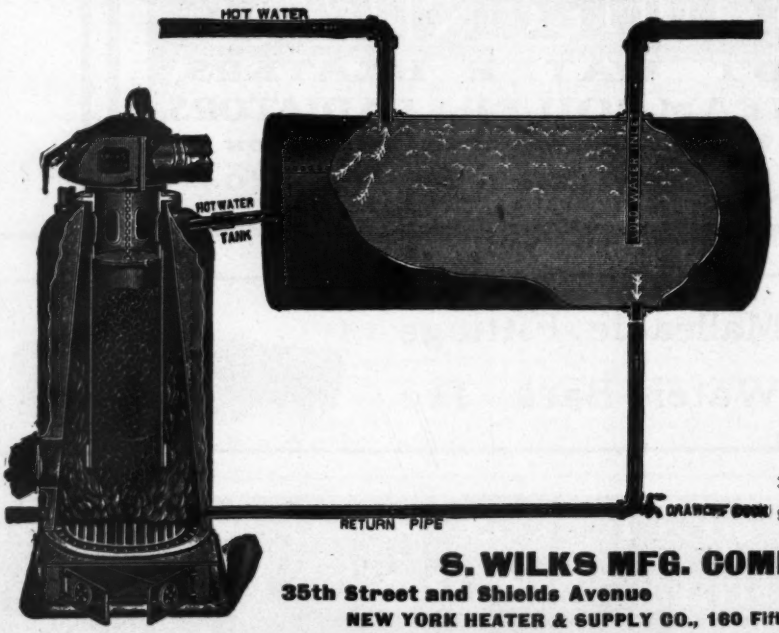
WROUGHT IRON DRAINAGE SYSTEMS

"Davis" screwed fittings for wrought iron pipe have an interior shoulder, and are made with same inside capacity as the inside diameter of the pipe, thus securing an unobstructed surface, allowing all solid matter to pass without choking up the pipes. They can be furnished in any quantity on short notice. Every size and style is found in our *special catalogue* of "Davis Drainage Fittings", with prices quoted.

THE JOHN DAVIS CO.

WRITE US TODAY CHICAGO 22nd & HALSTED STS.

WILKS HOT WATER HEATERS



For Heating Water for

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Send for our New Catalogue

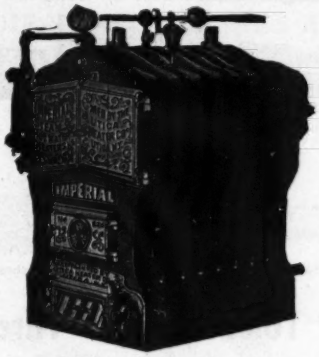
S. WILKS MFG. COMPANY

35th Street and Shields Avenue CHICAGO, ILL.

NEW YORK HEATER & SUPPLY CO., 160 Fifth Ave., New York City

THE ADVERTISEMENTS IN DOMESTIC ENGINEERING ARE INDEXED. TURN TO PAGE XXVI.

Famous Imperial Boilers



"IMPERIAL"

We want every steamfitter to have our new catalogue of Imperial Boilers—and learn all about this wonderful line of Sectional and Round Steam and Hot Water Boilers. There are no better boilers made at any price. Send for catalogue to-day. : : : : : : :

Utica Heater Co., Utica, N. Y.

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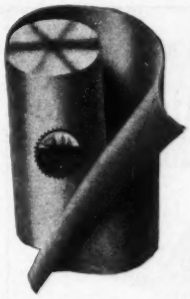
Chicago Heater & Supply Co., 56 and 58 Dearborn St., Chicago, Ill.



FIFTY YEARS

In the Manufacture of

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Asbestos Packings

Should be a sufficient guarantee that our packings are all that we claim for them.

Asbestos, the material of which they are made, possesses qualities that make "J-M" Packings the most efficient, durable and economical.

"J-M" Packings are absolutely fire-proof and never char, burn or blow out. They make renewals few and far between and are superior in every respect to rubber or other organic packings.

Write nearest branch for Packing Catalog No. 101

H. W. JOHNS-MANVILLE CO.

Manufacturers of Asbestos and Magnesia Products, Asbestos Roofings, Packings, Electrical Supplies, Etc.

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or 40 above is all alike to

THE BECKAM DAMPER REGULATOR

It does everything but put in coal and remove ashes. Keeps the temperature in the house at 70°, saves coal—saves money for the owner—makes money for the seller. Write us about it.

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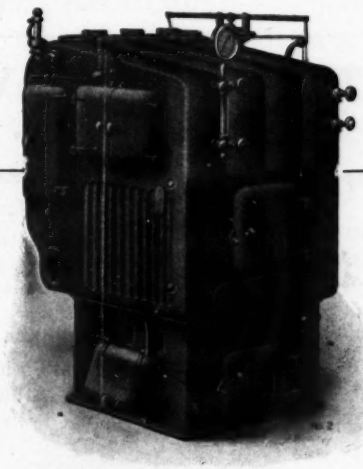

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"The Best Boiler Built"

The *LONG* fire travel and *SHORT* grate

More individual points of merit than any other boiler on the market. Give us an opportunity to demonstrate our claims. Write for catalog.

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Washington office, 621 13th St., N.W. Phila. office, Builders' Exchange.
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Boston Representative, The Wm H. Gallison Co., 36 Oliver St.
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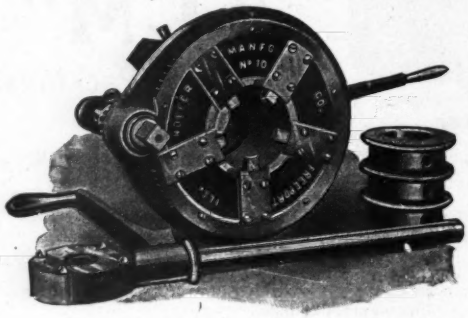
Let a boy with a

The "Hoefer" Adjustable Pipe Threading Machine

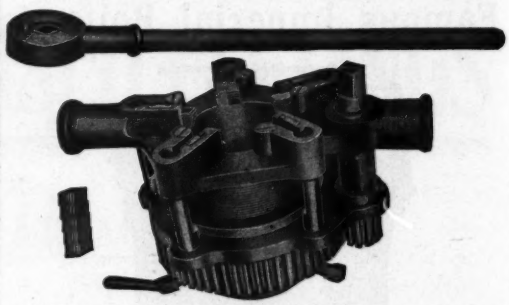


do the work of two men. Easy to operate, simple in construction, and light in weight.

NO CHANGE OF DIES NECESSARY

WRITE FOR PARTICULARS

HOEFER MFG. CO., Freeport, Ill.



This is our No. 2 Machine. Capacity from 2½ to 4 inches inclusive.

The "Toledo" Pipe Threader

IS DIFFERENT

ONE MAN can EASILY thread any size the tool will take. And they don't cost much. Ask your jobber about it.

Send for descriptive catalogue to

The Toledo Pipe Threading Machine Co.

TOLEDO, OHIO, U. S. A.

PITTSBURGH VALVE & FITTINGS CO.

Manufactures and carries in stock a complete line of the following:

Standard Screwed Fittings
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Extra Heavy Screwed Fittings
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Long Turn Screwed Fittings
Long Turn Flanged Fittings
Recessed Drainage Fittings
Malleable Iron Fittings
Iron Body Gate Valves
Iron Body Blow-Off Valves
Brass Wedge Gate Valves
Expansion Joints
Steam Traps
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Address all communications to General Office, Frick Bldg.

PITTSBURGH, PA.

You Want This Book

because it is a *practical* book—because it will show you how to do *better work*—because it will *put money down in your pants pocket.*

Notes on Heating and Ventilation

By JOHN R. ALLEN
Junior Professor of Mechanical Engineering
University of Michigan

contains *the very essence of expert knowledge—the boiled-down results of hundreds of experiments*—that vital, practical, *dollars-and-cents* kind of teaching that you can't get except by combining scientific study with actual practice.

There is no better authority on *Heating and Ventilation* than Prof. Allen. He is recognized as a master of these subjects And you get the condensed results of *all* his study, and *all* his experiment and *all* his actual work in the engineering field for only $2. You can't be a first-class, up-to-date man unless you make the knowledge in this book yours.

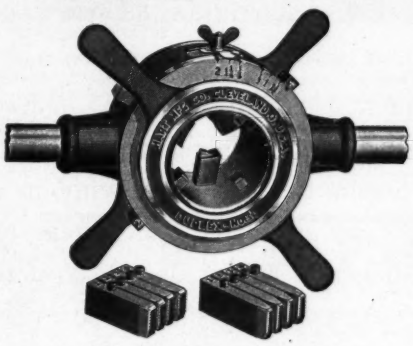
Tear out this page, write your name and address on the margin and mail it with a $2 bill *at our risk. Do it now.*

Domestic Engineering

58-64 North Jefferson Street, Chicago, Ill.

THE ADVERTISEMENTS IN DOMESTIC ENGINEERING ARE INDEXED. TURN TO PAGE XXVI.

Have you considered the advantages in a DIE STOCK with DIES ADJUSTED by hand, such as



The "DUPLEX"

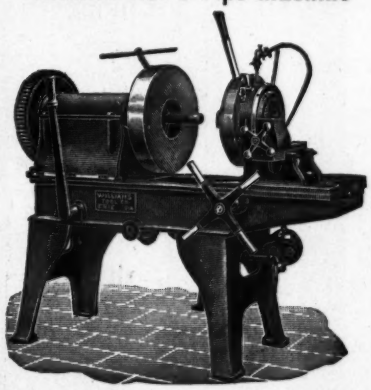
Threads go together just as desired. Over or slightly under standard size always obtainable, no difficulty in compensating for wear. Inquire of

THE HART MANUFACTURING CO.

9 WOOD ST., CLEVELAND, OHIO

Williams Tool Co.

Williams No. 3 Pipe Machine



Is a strong substantial tool that will cut and thread pipe from 1½ inches to 6 inches. It is a rapid worker, is equipped with Quick Opening Adjustable Dies and has six changes of speed without removing or replacing gear. *Send for Circulars and Prices.* We build Pipe Machines cutting from ¼ to 12 inches.

ERIE, PENN.

WHAT I put into print here I mean—I say: "Try the Nye Die 10 days at my risk and expense, and if you find that it doesn't cut pipe threading labor and cost in half,—if it doesn't pan out to be the best die you ever laid hands on—send it back—no hard feeling—"

Now you know that a man with a poor die wouldn't make such an offer—His fear of personal financial loss alone would prevent him—

There are no strings to my offer,—not a single string. The only thing that stands between you and a 10 days' free trial—a real personal test—is your own request.

Just write anyway to

"NYE"

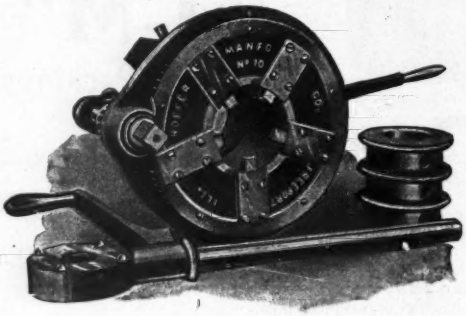
NYE TOOL & MACHINE WORKS

196-198 So. Clinton Street

CHICAGO, ILL.

Let a boy with a

The "Hoefer" Adjustable Pipe Threading Machine



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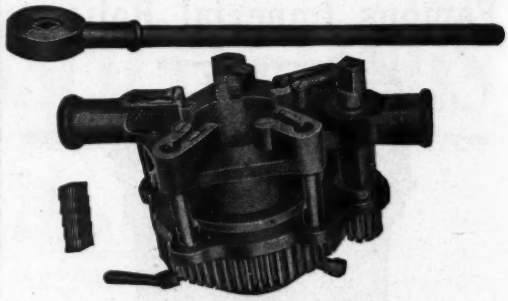

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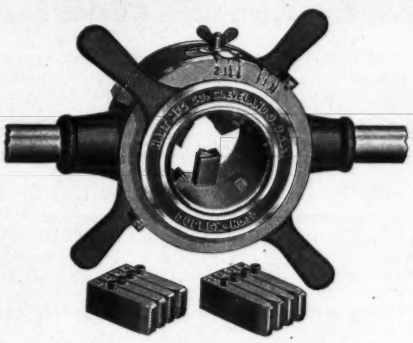

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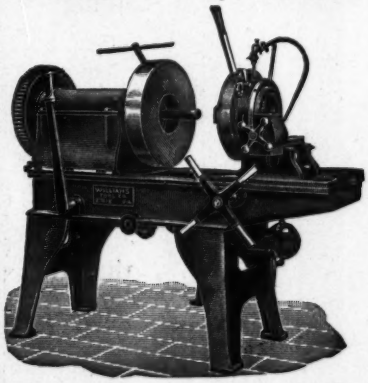

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Just write anyway to

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NYE TOOL & MACHINE WORKS

196-198 So. Clinton Street

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Utilize The Exhaust Steam

Otherwise Nearly 90 Per Cent of the Energy Extracted from Fuel is Lost

THE MOST PRACTICAL and most profitable economy in a power or light plant is the utilization of the exhaust steam. This fact presents a valuable opportunity to create a District Steam Heating Plant without a sensational increase of the original investment, by installing our system of **District Steam Heating.** Thirty years' experience has made our system perfect. We invite correspondence with those interested. Send for our new sixty page booklet. It is Free.

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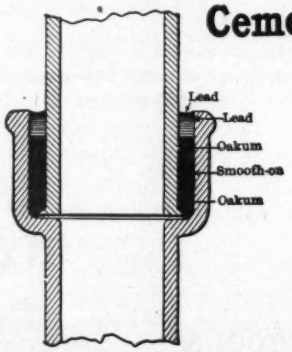
SMOOTH-ON

TRADE MARK

Iron **Cement**

For Soil Pipe



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CHICAGO OFFICE: 61 North Jefferson Street.

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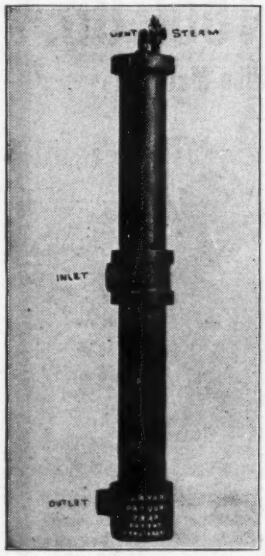

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System

I have one

that works

Write for Booklet "A"

E. J. Ryan **117 Walnut Street, Danville, Ill.**

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Gold Medal, St. Louis Exposition, 1904

Strongest PIPE WRENCH made

Ever consider time lost and expense incurred in replacing broken parts of your pipe tools? **Trimo Tools** are made to stand hard usage. Drop-forged from specially selected steel. Inserted Jaw in handle easily and cheaply replaced when worn out. **Every wrench guaranteed.** Send for Catalogue No. 42 showing full line.

TRIMONT MFG. CO., 55-71 Amory St., ROXBURY, MASS., U. S. A.

In Tight Places

Where you haven't room to turn a die stock, as in a ditch, against a wall, another pipe, etc., Armstrong's Ratchet Attachment is almost indespensable. It fits any Genuine Armstrong stock, is well made and costs but little. Circulars and prices upon request.

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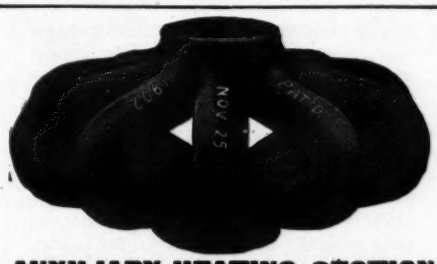
CHICAGO OFFICE, 23 So. CANAL ST.



AUXILIARY HEATING SECTION
is also in use for heater for utilizing exhaust heat of gasoline engines
Anderson-McCutchen Co., Peekskill, N. Y.

THE STAR
Radiator Shield

The most practical, substantial and beautiful shield on the market.

Write us for prices

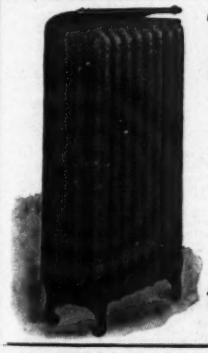
J. Rutherford & Son
Akron, Ohio

A Profit Maker for You
IS OUR
Acme Radiator Shield

fitted with **Copper Water Pan** for supplying moisture. Made with a dust gutter for catching the dust circulated by the radiator. Made of corrugated galvanized iron and ornamental cast ends.

Easy to Sell. Easy to Install

W. H. Johnson & Son Co.
943-945 Fort Wayne Avenue
INDIANAPOLIS, . INDIANA



THE A. & J.
Radiator Shield

The best shield on the market for protecting the wall. *Finished in any style.*

Andrews & Johnson Co.
CHICAGO, ILL.

"Perfect" Radiator Shield

Newly improved. Adjustable in all parts to fit any make or design of radiator. Artistic in appearance—practical in construction.

For prices and circulars write

DECATUR CORNICE & ROOFING COMPANY
620 Main Street, Decatur, Ill.

THREE EXCLUSIVE FEATURES OF THE

Homestead Automatic WATER HEATER

SIMPLICITY

By simply lifting latch, and removing the front casting, exposes to view the interior, every part can be removed without detaching heater from connections, all parts being interchangeable.

EFFICIENCY

The one piece double burner, with coil arrangement, allowing the gas to directly impinge all parts of the coil, thus quickly heating water to a high temperature, with a minimum amount of gas.

DURABILITY

The *Homestead Water Heater* being all cast iron, and the coils 18 gauge copper tubing, warrants the life of the Homestead Heater, no parts subject to corrosion. Write for booklet.

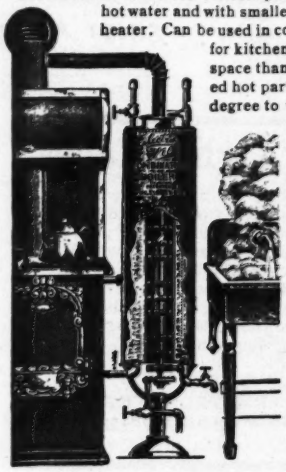
Homestead Heater & Mfg. Co.

HOMESTEAD, PA.

Electric Weld Combination Boiler and Heater

(Deasy Patent)

Can be used for any purpose where it is desirable to heat water by gas, and moreover is the best for that particular purpose. It gives MORE hot water and with smaller gas consumption than any other heater. Can be used in combination with Range Water Back for kitchen installation. Takes up no more space than ordinary Range Boiler. No exposed hot parts (Note that). Does not add one degree to temperature of room. (Note this too as these points are exclusive with this heater.) No coils to clog up and renew. Complete absorption by the water of all the heat in the gas. Made in any size for basement installation, in combination with furnace and with thermostatic control. Best installation on the market for Flats or Public Buildings. Hundreds of enthusiastic users. If the trade mark "Electric Weld" is not sufficient guarantee this Heater is all that is claimed, write us for PROOF. It **will pay you Mr. Plumber to know more of this—your customers will thank you.** Handled by Jobbers of Plumbing Supplies. Made in sizes from 30 gallons to 250 gallons.



JOHN WOOD MFG. CO., Conshohocken Pa.

Needs Showing That's All

The Peer Kitchen Boiler Heater

is a boiler stand with a self-contained heater. You do not have to educate people all over to get them to use it. People are used to range boilers, and they can see this is an improvement. The tank can be heated from top to bottom with less than 20 feet of gas. No other heater can compare with this. Let us send you our booklet today. Write for particulars.

The Peer Water Heater Co., Inc.

39 STATE ST., CHICAGO

Fernando W. Pripps Co., 131 Oneida St., Milwaukee, Wis. Geo. R. Ives, 423 West 7th St., Los Angeles, Cal. G. W. Burchard, 412 Main St., Kansas City, Mo.

The Famous Niagara Automatic Water Heater

Regulated by a Thermostat so as not to raise the temperature of the water above a specified degree. When other heaters that cannot be controlled send the water to the boiling point, the lime and other minerals are precipitated and form a bad incrustation. This heater uses gas for fuel and is very economical. Send for our booklet. It is free. Address all letters to

Hammond-Homberger Co.

SILVER CREEK, N. Y

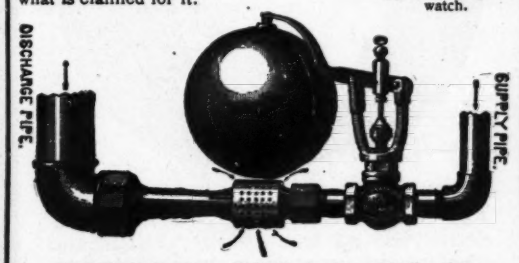
THE ADVERTISEMENTS IN DOMESTIC ENGINEERING ARE INDEXED. TURN TO PAGE XXVI.

The BRAENDER
Automatic
CELLAR DRAINER
and BILGE SYPHON

Operated by Water or Steam Pressure

It is the best, therefore the cheapest. It is used in Municipal and U. S. Government Departments, endorsed by leading sanitary experts, and is guaranteed to do what is claimed for it.

The Braender Bilge Syphon. Always on watch.



Sold to the trade only. Write for circular and testimonials.

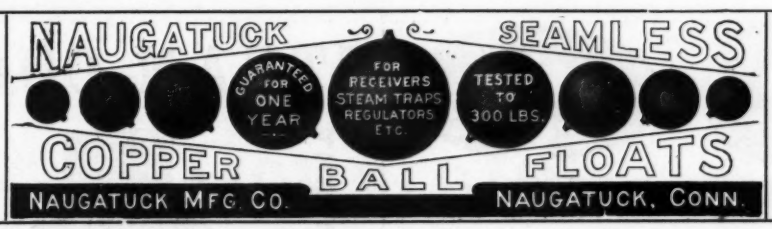
PHILIP BRAENDER, 143 W. 125th St., New York
Sales Agent: W. N. McKenna Co., 75 Chestnut Street, Boston, Mass.

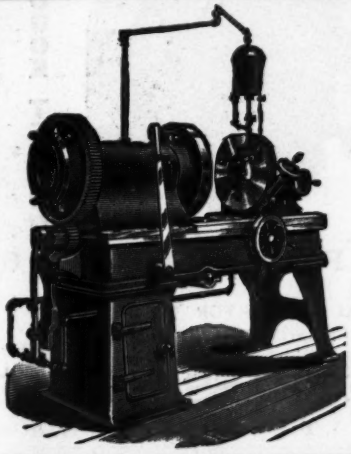
The "Burnham" Way

of making a round boiler is to cast it in one piece above the base—Give it a fire pot deeper than any other—Make the fire surface way ahead, in proportion to the grate area—Have a decent grate that really is anti-clinker—Let it be easy to clean—That's Burnham's way—and a lot of people like it. Send for catalog.

LORD & BURNHAM COMPANY
IRVINGTON, N. Y.

Boston; 818 Tremont Building. Phila.; Keystone Supply & Mfg. Co. Chicago; Chicago Heater & Supply Co. Providence; Allen & Reed, Inc. Minneapolis: Roberts Heating & Ventilating Co.





Pipe Threading and Cutting TOOLS

Write for catalogues showing the most complete line of ⅛-inch to 16 inches for Hand, Belt, Engine, and with Electric Motor Attachment. We can furnish Bolt-Threading Attachment for these machines.

We also make Erie Pipe Hangers, Erie Malleable Unions and Malleable and Gray Iron Pipe Fittings.

Jarecki Manufacturing Co., Erie, Pa.

The National No. 5 Lock Shield Valve

Embodies all the best features of modern valve construction. It is large, carefully made, easy to adjust and cannot be tampered with by unauthorized persons, as key is in possession of Engineer or Janitor.

The composition is incased in a brass casing, therefore cannot buckle, and last of all, our *Five Years' Guarantee* backs up our claims without any strings attached.

Our sales on this valve for the past twelve months were double those of the previous year.

Are you in the market for High-grade Air Valves?

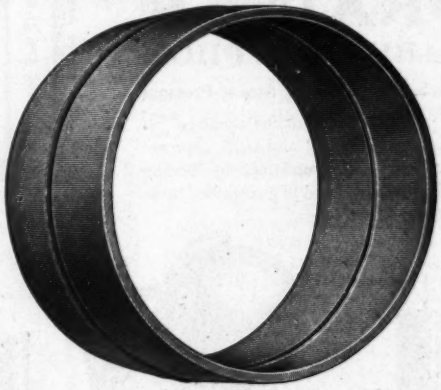
Then write us today.

National Steam Specialty Co.

230 E. Washington St., Chicago, Ill.

Samples Free

to those who are interested in testing the best methods of connecting Radiation and Heating Boilers.



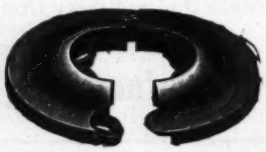
Zinc Coated Steel Slip Nipples are Rust-proof; impervious to distilled water; not affected by electrolysis; all true to size; elastic and adaptable to variation in boring castings.

The Pratt Chuck Co., Frankfort, N. Y.

Eight different styles of floor and ceiling plates ranging in size from ¼ inch to 8 inches. Carefully finished, all being coppered before nickeling. Send for catalog and prices to the old original company.

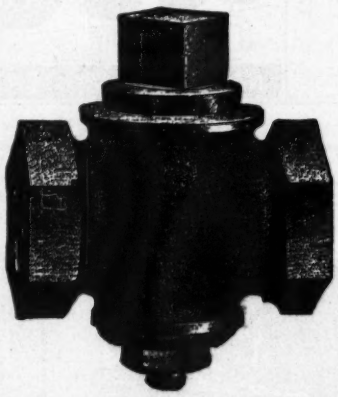
The Beaton & Corbin Mfg. Co.

Southington, Conn., U. S. A.



STEAM COCKS

PERFECTLY GROUND



EVERY COCK TESTED

SEND FOR CATALOG

EVERYTHING IN BRASS FOR THE PLUMBER AND SOME THINGS FOR THE STEAMFITTER

EAGLE BRASS WORKS

DETROIT, MICHIGAN

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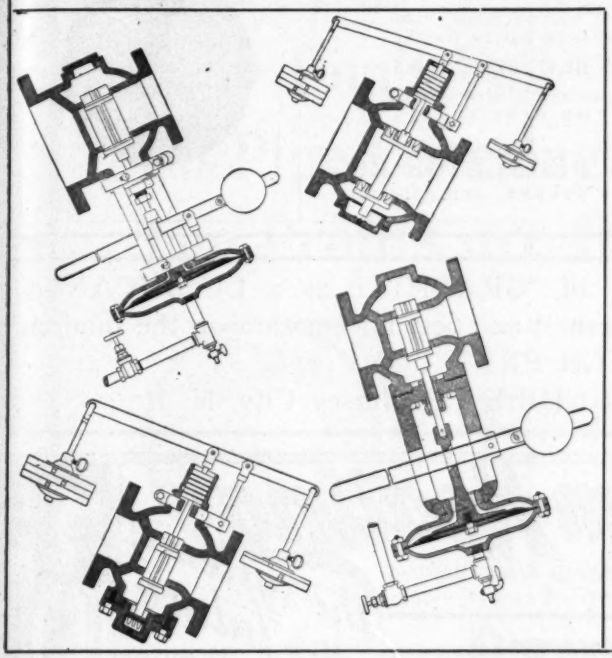
A Square Deal to the Trade on Prices



We have no agents to pay commission to.

MONASH REDUCING Valve prices are RIGHT and remain the same whether specified or not.

Piston and Diaphragm for all styles of heating Systems including Paul Steam System and Warren Webster System.

Write for set of blue prints and discounts.

MONASH-YOUNKER CO.
NEW YORK CHICAGO

Fitters Doing Better Work

Honeywell Heat Generator

PERMITS BOTH

Fitters Making More Money

More progress is being made in hot water heating today than ever before. We have shown fitters how to install new systems and cure sick old ones; with much less labor, much more profit and better results. Want to know? Write for our free booklet.

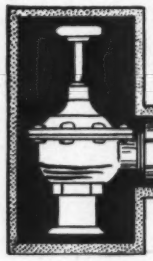
Honeywell Heating Specialty Company
WABASH, INDIANA

TO HELP YOU SELL!

WE HAVE A MOST EXCELLENT PLAN
FOR HELPING THE DEALER TO SELL
POWERS HEAT REGULATORS
THERE IS MONEY IN IT FOR YOU
WRITE FOR PARTICULARS

POWERS REGULATOR CO.
40 DEARBORN STREET, CHICAGO, ILL.

Write for a brand new copy of "GRAPHITE as a LUBRICANT," Tenth Edition. All the newest, freshest and best information on the modern practice of graphite lubrication. Get FREE COPY 37-C. : : : : : : :
JOSEPH DIXON CRUCIBLE CO., Jersey City, N. J.



Vacuum Heating

POST YOUR SELF MARVELOUS FUEL SAVING
Write for New Catalogues, full particulars and prices

the system of the future

Kellogg Mackay Cameron Co. SOLE OWNERS
CHICAGO MINNEAPOLIS KANSAS CITY SEATTLE

MORGAN PATENTS

NO LEAKS

FOR 20 YEARS

No Leaks of Any Kind

USE CALLAHAN'S STEAM
JOINT AND PIPE CEMENT

Send for catalog and blotters

As a gasket, with gaskets or in place of red lead, as a paste, stiff putty or paint. Oldest, cheapest and best for plumbers, steamfitters, mills, etc.

GEO. CALLAHAN & CO.
Factory 218 Front St. 129 Front St., New York

Hot Water Heating Contracts and Specifications

We have for sale a standard specification and contract for hot water heating. It is elastic and suitable for large and small contracts. Printed on good linen paper. Price list, delivered to you:

50 copies	$ 2.50
100 copies	3.50
500 copies	10.00

Terms: Chicago or New York draft with order. Sample sent free on request.

DOMESTIC ENGINEERING
58-64 N. Jefferson St., Chicago

PIPE STRAPS

Single; double; brass; n. p.; rubber bumpers.

Send for catalogue of plumbing specialties

THE SMITH & EGGE MFG. CO.
Bridgeport, Conn.

PIPE FITTINGS AND VALVES

FOR THE
HEATING AND PLUMBING TRADE

TRADE MARK

JOHN SIMMONS CO.
104-110 Centre Street, NEW YORK.

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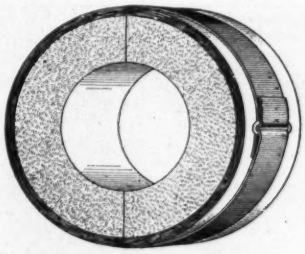
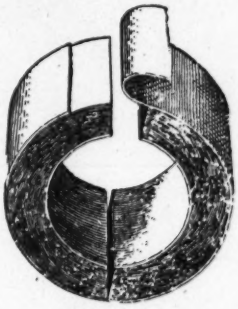
Why Don't You Do Pipe Covering? The Profits are Great.



Vim Covering



Felt Covering

EVERY steam power plant and every steam or water heating plant in your town ought to be covered. You can get this profitable work if you go at it right. We will tell you how and furnish you free samples if you will write us.

Now is a good time to begin.

Norristown Magnesia & Asbestos Co.

NORRISTOWN, PA.

Formerly known as, "Norristown Covering Co."

REPRESENTATIVES:

E. Curtis, Boston, Mass.
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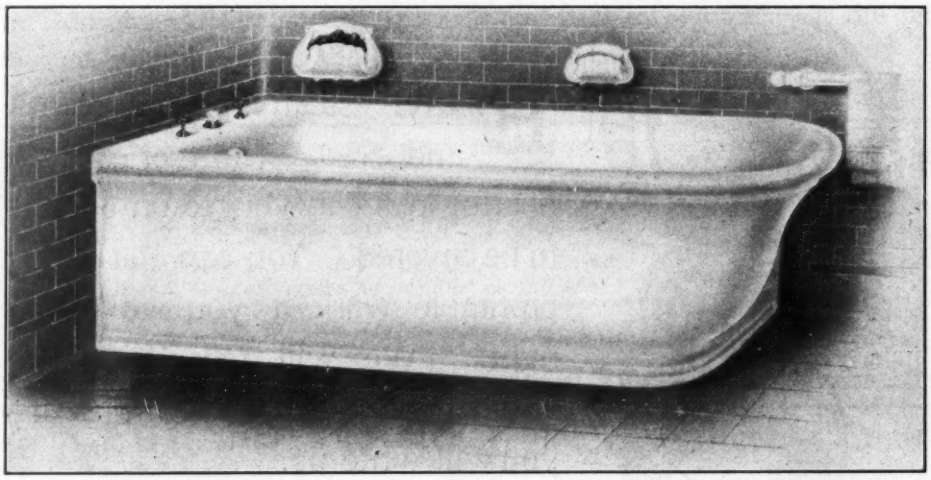
John R. Livezey, Washington, D. C.
Phelps Bros., New York, N. Y.
Chicago Heater & Supply Co., 56–58 Dearborn Street, Chicago, Ill.
National Insulating & Manufacturing Co., 764 Massachusetts Ave., Indianapolis, Ind.

The Trenton Potteries Company

New Style "Seville" Bathtub—"Ideal" Solid Porcelain Ware



This Bathtub is of the French Style with one rounded end and the other end and back tiled into wall. The fittings are fastened in the tub as shown.

The Trenton Potteries Company

Trenton, New Jersey, U. S. A.

THE ADVERTISEMENTS IN DOMESTIC ENGINEERING ARE INDEXED. TURN TO PAGE XXVI.

"Standard"

Porcelain Enameled Closets

"Standard" Closets with Porcelain Enameled Tanks and Bowls are destined to become the *standard* of all closets, and sample fixtures should be displayed in the showrooms of progressive plumbers and jobbers. Every fixture bears the **"Standard" Green** and **Gold** Label.

Plate P 860. List Price, $40 00

"Standard" Porcelain Enameled "Security" Closet, with Oval Birch Seat and Cover, dark mahogany finish, Delecto Syphon Jet Bowl, Enameled in and out Low Tank, Nickel-plated Brass Supply Pipe with Compression Stop, Flush Connection, Spun Cups, Brass Floor Flange, Rubber Gasket, Screws, Bolts and Washers complete.

Plate P 861. List Price, $40,00

"Standard" Porcelain Enameled Closet, with Oval Birch Seat and Cover, dark mahogany finish, Delecto Syphon Jet Bowl, Enameled in and out Tank, with Curved Front and Flat Top, Nickel-plated Brass Supply Pipe with Compression Stop, Flush Connection, Spun Cups, Brass Floor Flange, Rubber Gasket, Screws, Bolts and Washers complete.

Standard Sanitary Mfg. Co.

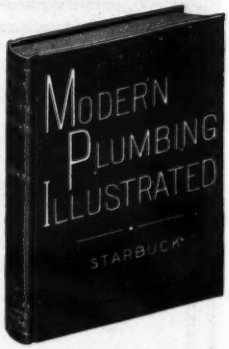
PITTSBURGH, U. S. A.

JUST PUBLISHED A NEW BOOK FROM COVER TO COVER

MODERN PLUMBING ILLUSTRATED

By R. M. STARBUCK

Author of "Questions and Answers on the Practice and Theory of Sanitary Plumbing," "Questions and Answers on the Practice and Theory of Steam and Hot Water Heating," "Hot Water Circulation Illustrated," "Examination Charts for Boards of Health," "Examination Charts for Plumbers' Unions," "The Starbuck Plumber's Estimate Book," Etc.



384 Large Quarto Pages. Fully illustrated by fifty-five full page and detailed Engravings, which have been made expressly for this book.

PRICE $4.00

The only Thorough and Practical Work Issued on the Modern and Most Approved Methods of Plumbing Construction, Illustrating and Describing the Drainage and Ventilation of Dwellings, Apartments and Public Buildings, Etc., the Standard Work for Plumbers, Architects, Builders, Property Owners, and for Boards of Health and Plumbing Examiners.

This work in a sense is an outgrowth of and an improvement upon Starbuck's Series of fifty blue-print charts known as "Modern Plumbing Illustrated," the rights of which have been purchased and its publications discontinued. The present volume is a large and substantial cloth bound work of 384 pages (7½ x 10½), in which is treated in a comprehensive manner High Grade Modern Plumbing, showing detail work and complete plumbing systems. The subjects considered ranging from the connections of fixtures and all other detail work to all classes of private and public buildings. It contains fifty-five full page or detailed plates which have been drawn specially for the work. These plates show all kinds of modern plumbing work. **Each one of these fifty-five detailed plates are accompanied by several pages of descriptive matter, in many instances as many as eight or ten pages of text being devoted to a single plate. This text forms a critical and concise treatment of each phase of the work under discussion.**

LEADING FEATURES OF THIS WORK

It Represents the Highest Standard of Work—Adopted by the United States Government in its sanitary work in Cuba, Porto Rico and the Philippines, and by the principal Boards of Health of the United States and Canada.
It Gives Connections, Sizes and Working Data for All Fixtures and Groups of Fixtures.
It Helps the Master Plumber in Demonstrating to His Customers and to Figure Work with Greater Facility.
It Gives the Mechanic and Student Quick and Easy Access to the Best Modern Plumbing Practice.
It is a book for the man who recognizes the necessity of providing himself with the best literature of his craft.
It Gives Suggestions for Estimating Plumbing Construction.

Containing Illustrated Chapters on

1 Kitchen Sink, Laundry Tubs, Vegetable Wash Sink
2 Lavatories—Pantry Sinks, Contents of Marble Slabs
3 Bath Tub—Foot and Sitz Bath, Shower Bath
4 Water Closets—Venting of Water Closets
5 Low-Down Water Closets—Water Closets Operated by Flush Valves—Water Closet Range
6 Slop Sink—Urinals—The Bidet
7 Hotel or Restaurant Sink—Grease Trap
8 Refrigerators — Safe Wastes — Laundry Waste
9 Lines of Refrigerators, Bar Sinks—Soda Fountain Sinks
10 Horse Stall, Frost-Proof Water Closets
11 Connections for S. Traps, Venting
12 Connections for Drum Traps
13 Soil Pipe Connections
14 Supporting of Soil Pipe
15 Main Trap and Fresh Air Inlet
16 Floor Drains and Cellar Drains—Subsoil Drainage
17 Water Closets and Floor Connections
18 Local Venting
19 Connections for Bath Rooms
20 Connections for Bath Rooms, Continued
21 Connections for Bath Rooms, Continued
22 Connections for Bath Rooms, Continued
23 Examples of Poor Practice
24 Roughing-work Ready for Test
25 Testing of Plumbing System
26 Method of Continuous Venting
27 Continuous Venting for Two-Floor Work
28 Continuous Venting for Two Lines of Fixtures on Three or More Floors
29 Continuous Venting of Water Closets
30 Plumbing for Cottage House
31 Construction for Cellar Piping
32 Plumbing for Residence—Use of Special Fittings
33 Plumbing for Two-Flat House
34 Plumbing for Apartment Building
35 Plumbing for Double Apartment Building
36 Plumbing for Office Building
37 Plumbing for Public Toilet Rooms
38 Plumbing for Public Toilet Rooms, Continued
39 Plumbing for Bath Establishment
40 Plumbing for Engine House—Factory Plumbing
41 Automatic Flushing for Schools, Factories, etc.
42 Use of Flushing Valves
43 Urinals for Public Toilet Rooms
44 The Durham System—The Destruction of Pipes by Electrolysis
45 Construction of Work without use of Lead
46 Automatic Sewage Lift—Automatic Sump Tank
47 Country Plumbing
48 Construction of Cesspools
49 Septic Tank and Automatic Sewage Siphon
50 Country Plumbing
51 Water Supply for Country House
52 Thawing of Water Mains and Service by Electricity
53 Double Boilers
54 Hot Water Supply of Large Buildings
55 Automatic Control of Hot Water Tank
Suggestions for Estimating Plumbing Construction

DOMESTIC ENGINEERING

49-53 N. Jefferson Street, Chicago, Ill.

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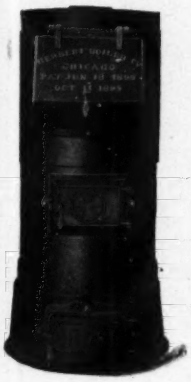
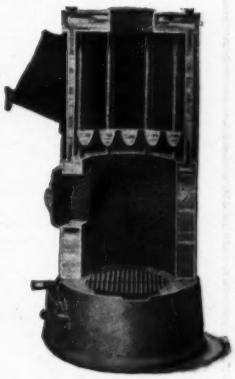
Herbert Garbage Burning Water Heater



Specified by leading architects of 74 cities

Guaranteed to consume entirely all garbage, emitting no smoke nor smell through doors. By burning the refuse fuel bill is reduced one-third: hot water supplied in abundance.



Mention booklet G. B. when writing

Herbert Boiler Company
240 Root Street, Chicago

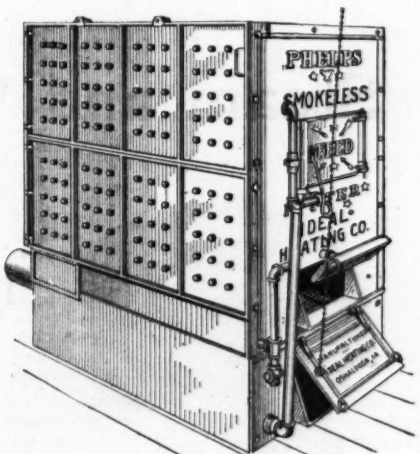
PHELPS

SMOKELESS HEATERS GIVE BEST RESULTS

They maintain the highest Efficiency in service, and economy of fuel against the most active competitions of the smoke belching, conventional type.

We occupy a position second to none in our line and invite correspondence with a view to establishing your connections for the next heating season.

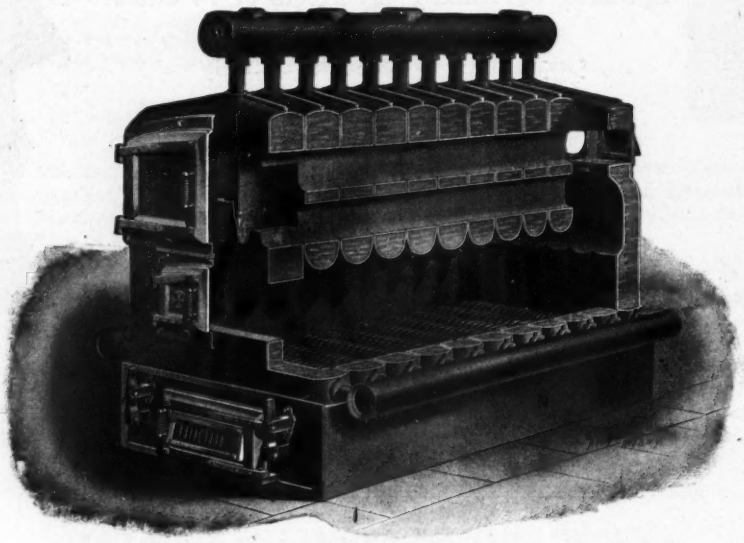
Booklet and prices cheerfully furnished on request.



Designed and constructed to Coke the soft Western Coals and burn the soot and gases.

THE IDEAL HEATING CO.
OSKALOOSA, IOWA.

The Mercer Boiler



SECTIONAL VIEW

FOR

Steam and Water Warming

THE REED
(Patented)
Rotating Grate

Used in all Mercer Boilers

THE H. B. SMITH CO.
BOILERS and RADIATORS

WORKS
WESTFIELD, MASS.

SALESROOMS
133 Centre Street, New York, N. Y.
728 Arch Street, Philadelphia, Pa.

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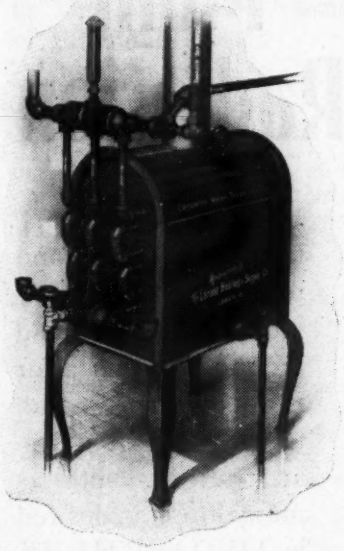
$100.00 Reward



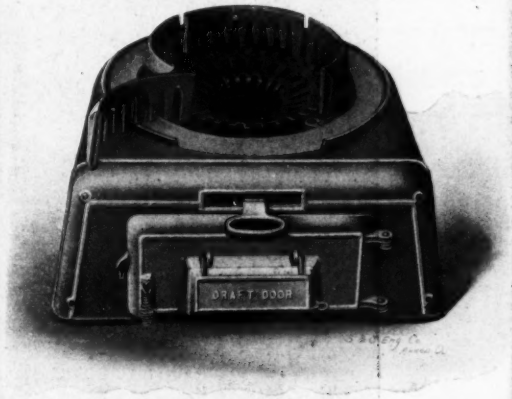
We will pay one hundred dollars for a typhoid germ that has gone through our hot water heater and come out alive. Our only stipulation is that said germ must be brought to at least 212° Fahrenheit while in the heater—but that's easy with the Lorain Heater, which is the fruit of twenty years' experience. We are safe in saying that there is not a hot water heater on the market today that can equal it in efficiency, simplicity and economy.

The Lorain Heating & Supply Co.
LORAIN, OHIO

Don't Risk Anything

You will not have that feeling of uncertainty about your jobs if you use *PRUDENTIAL ROUND HEATERS.* They can be relied upon to meet every economical requirement.

STEAM OR HOT WATER



PRUDENTIAL HEATING COMPANY
WRITE FOR BOOKLET AKRON, OHIO

XXth Century Water Tube Sectional Boilers, Warm Air Furnaces, Radiators and Supplies

Special Features

Large amount of fire surface.
Kind of fire surface. Inclined tubes.
Rapid Circulation. Perfect mixture of gases.
Perfect combustion. Superheating chamber.
Guaranteed saving in fuel. Convenient to fire.
Convenient to clean. Simple to install.

Inclined tubes, fire and water travelling in the same direction, following nature's laws. Every inch of fire surface is also water surface. The largest fire area, and water area, confined within a certain space, and over a certain sized grate. We defy contradiction, and we further defy anyone to show the equal.

If you were going to heat a gallon of water in the shortest space of time, with the least quantity of fuel, would you put it into a tin horn, having a narrow base in contact with the fire, or would you put it into a large wash boiler, exposing the largest surface to the fire?

XXth Century Heating & Ventilating Co.

BRANCHES

Chicago, Ill.	Nashville, Tenn.	Cleveland, Ohio.
Memphis, Tenn.	Denver, Colo.	Atlanta, Ga.
Kansas City, Mo.	Birmingham, Ala.	Minneapolis, Minn
Rochester, N. Y.	Louisville, Ky.	Pittsburg, Penna.

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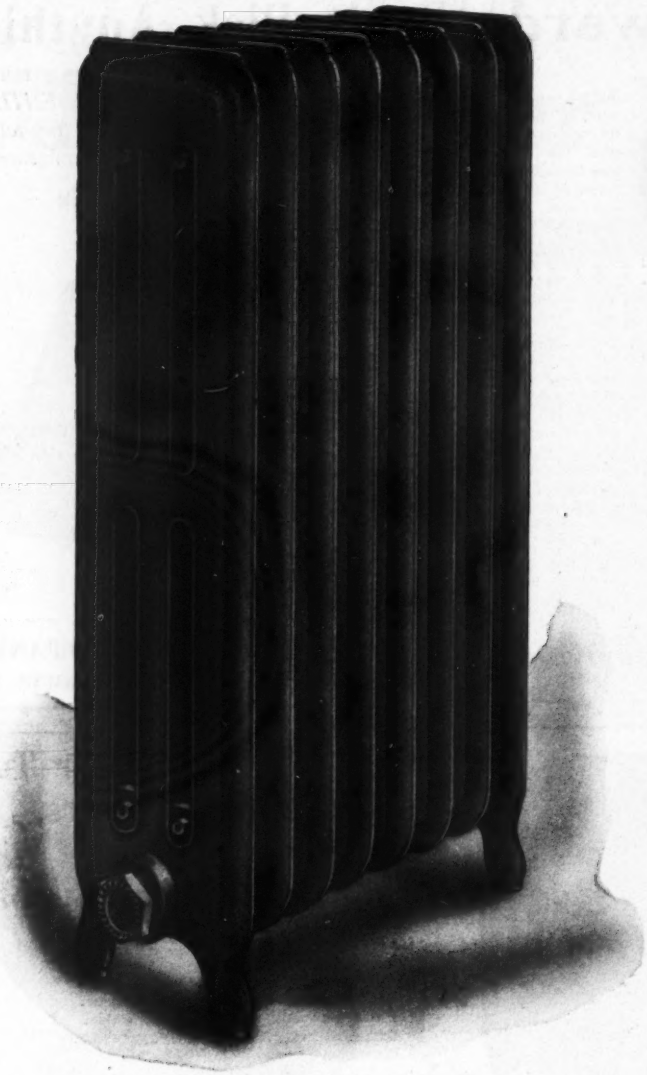

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THE ADVERTISEMENTS IN DOMESTIC ENGINEERING ARE INDEXED. TURN TO PAGE XXVI.

A Plumbing Catechism

or The Theory and Practice of Plumbing Design in Question and Answer

by

CHAS. B. BALL, M. Am. Soc. C. E.

Member American Society Inspectors of Plumbing and Sanitary Engineers. Formerly Chief Sanitary Inspector Tenement House Department, New York.

AND

H. T. SHERRIFF, A. B., Editor of Domestic Engineering

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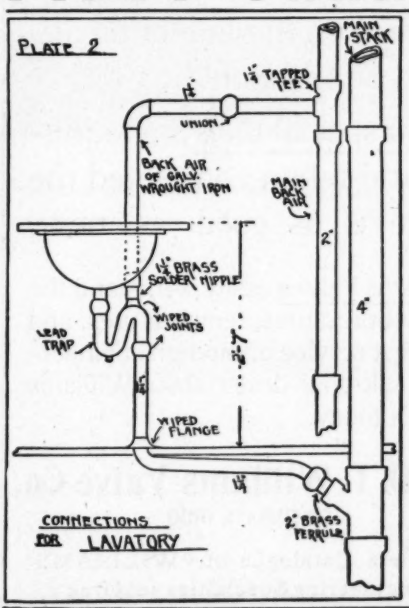

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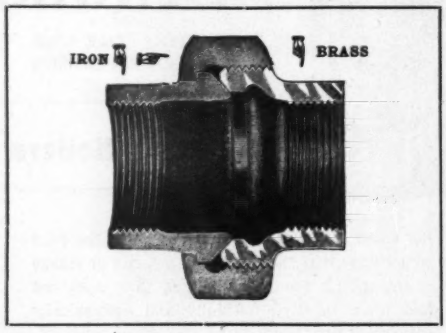

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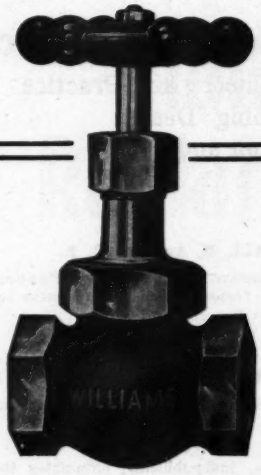

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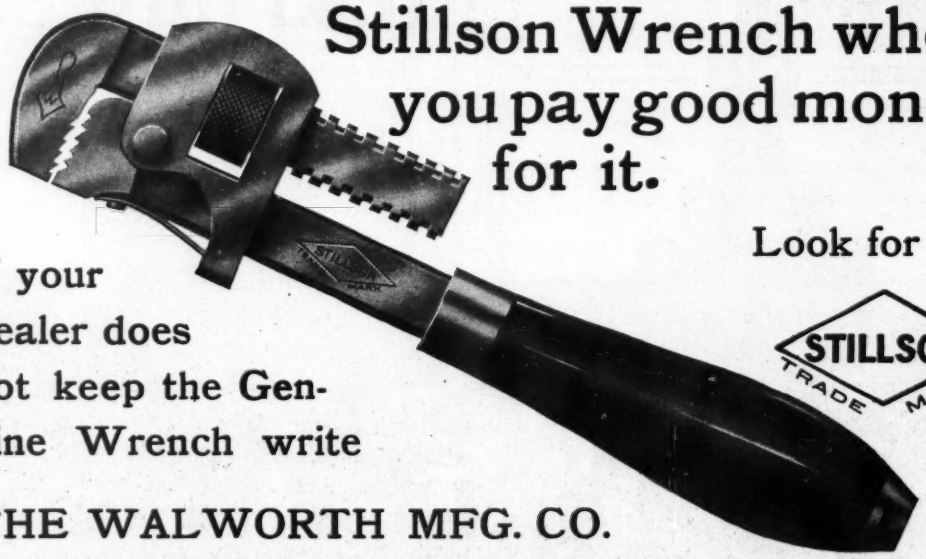

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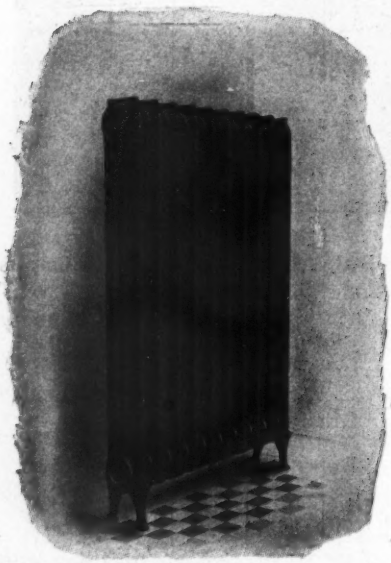

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DOMESTIC ENGINEERING

PLUMBING HEATING LIGHTING MILL SUPPLIES

Weekly: $1 a Year. Chicago, Saturday, March 2, 1907. Whole No. 742. Vol. XXXVIII. No. 9.

Every man is worth just so much as the things are worth about which he busies himself. **MARCUS AURELIUS.**

Hot Blast Heating—II*

An Exhaustive Treatment of the subject

BY CHAS. L. HUBBARD

(Continued.)

HAVING determined the total heat required for heating and ventilating a building it is often desirable to know the temperature to which the entering air must be raised. When the air is taken from out of doors we may consider that the heat required to raise its temperature from that of the outside atmosphere to 70 degrees (or other normal inside temperature) is lost so far as warming the building is concerned, provided the temperature of the building is maintained at 70 degrees by other means. For purposes of illustration we may take the case of a room warmed to 70 degrees by direct radiation and ventilated by air supplied by a fan at a temperature of 70 degrees. It is evident that the air has practically nothing to do with warming the room. It simply passes through without giving up or absorbing heat, being at the same temperature as the air in the room which it displaces. Now, suppose we remove the direct radiation and do its work by heating the entering air to a higher temperature than before. The volume of air and the heat required to raise its temperature to 70 degrees are the same as before, but it is made the vehicle for bringing in an additional quantity of heat equal to that furnished by the direct radiation, which has been discarded. The problem now becomes to what final temperature will this additional heat raise the entering air?

Determining Final Temperature.

Going back to our formula for heat required for ventilation, let "C"= cubic feet of air to be supplied per hour and "T= the rise in temperature and "H"= the heat units required to produce the given rise in temperature. Then from what has previously been stated we have $H=\frac{C\times T}{55}$, which transposed may be written in the form $T=\frac{55H}{C}$

Application of the Formula.

In the present case we have a known volume of air coming into a room at a temperature of 70 degrees, and wish to heat it to such higher temperature as will cause it to bring in a certain known quantity of heat. How many degrees above 70 must the air be heated to produce this result? Here the values of H and C are known, and we simply have to substitute these values in the above formula and solve for T, and this result added to 70 will give the temperature at which the air must be introduced to both ventilate and warm the room. Applying this to our previous example, we have an air volume of 288,000 cubic feet per hour and wish to bring in 468,160 heat units per hour for "warming purposes." At what temperature must the air be introduced? Substituting in the formula we have $T=\frac{55\times 468{,}160}{288{,}000}=90$ in round numbers, which added to 70=90+70=160 degrees as the final temperature of the entering air. Under actual

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conditions it would be better to increase the volume of air and so reduce the temperature if the building was used for manufacturing or other purposes having a considerable number of occupants. If it was used for storage or similar purposes, where warmth only was considered and where the breathing quality of the air was of minor importance, air at the higher temperature could be used.

Rotating Air Through Heaters.

This brings us to cases where the air is not taken from out of doors, except as it leaks in, but is rotated continuously through the heater. Under these conditions the heat required to raise the air from outside temperatures to that of the building drops out of the problem, and we only have to supply sufficient heat to offset that lost through conduction and leakage. The air passed through the fan is simply the medium for distributing the heat and is analogous to the water in a hot water heating system.

"A Noble Quartette." Reading from left: A. T. Dyer, Philadelphia branch manager for the Prizer-Painter Stove & Heater Co.; H. M. Grossman, of Bridgman Bros., Philadelphia, Pa.; R. W. Belfield, of H. Belfield & Co., Philadelphia, Pa., and William Heine, a prominent master plumber of Wilmington, Del. The picture is taken in front of the latter's shop in that city. Photograph by our Mr. Winslow.

The water is heated in the boiler and flows by the action of gravity to the radiators, where it gives up its heat, and flows back to the boiler again through the return pipes. In the case of a fan system for the rotation of air the heater or coil takes the place of the boiler, the water is replaced by air, and circulation is produced by a fan instead of by gravity. In each case the circulating medium is used over and over again, except as it has to be replaced from time to time due to leakage. The volume of air or water required depends upon the amount of heat it is desired to transmit and the temperature to which the medium can be easily and economically raised. This will be taken up later under the subject of heaters and radiators. So far as *economy* of operation is concerned, taking air from out of doors is similar to feeding a steam boiler with cold water and turning the water of condensation with all of its contained heat into the sewer. But in hot-blast heating the matter of fresh air for ventilation has to be considered as well as warming, and in cases of this kind the heat is as essential and the expenditure for additional fuel is as necessary as in the case of heating alone.

Volume of Air Provided.

From what has been said it is plain that the volume of air provided plays an important part, both as to the quantity of heat required and the quality of the air furnished for ventilation.

In taking up this part of the subject the writer can do no better than to quote briefly from an article appearing under his name in a recent number of the Heating and Ventilating Magazine.*

It has been found by experiment that the average production of carbonic acid gas by an adult at rest is about .6 cubic feet per hour. If we assume the proportion of this gas as 4 parts in 10,000 in the external air, and are to allow 6 parts in 10,000 in an occupied room, the gain will be 2 parts in 10,000, or, in other words, there will be $\frac{2}{10{,}000}=.0002$ cubic feet of carbonic acid mixed with each cubic foot of fresh air entering the room. Therefore, if one person gives off .6 cubic feet of carbonic acid per hour, it will require $.6 \div .0002 = 3{,}000$ cubic feet of air per hour per person to keep the air in the room at the standard of purity assumed, that is, 6 parts of carbonic acid in 10,000 of air. Table 2, computed by the above method, gives the quantity of air which must be supplied per hour per person to maintain various standards of purity.

Table 2.

Giving the Quantity of Air Which Must Be Supplied per Hour per Person.

Standard Parts of Carbolic Acid in 10,000 of Air in the Room.	Cubic Feet of Air per Person. Per Minute.	Per Hour.
5	100	6,000
6	50	3,000
7	33	2,000
8	25	1,500
9	20	1,200
10	16	1,000

*Practical Points on Ventilation, "Heating and Ventilating Magazine," September, 1906.

While this table gives theoretical quantities of air required for different standards of purity, and may be used as a guide, it will be better in actual practice to check the above by data which experience has proved to give satisfactory results in different types of buildings.

(To be continued on March 16.)

The Sanitary Sewerage of Buildings*

BY THOMAS S. AINGE

Sanitary Engineer, Michigan Department of Health

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CHAPTER II.

OUTSIDE SEWERS

(Continued.)

SIZE AND INCLINATION.

IN determining the size and inclination of the sewer, the following important considerations should govern the calculation:

1. The sewer should be small enough and have the proper inclination to cause the normal flow of sewage to fill the sewer to such a height as will render it self-cleansing.

2. The sewer should be large enough and have sufficient inclination to remove a considerable volume of sewage, or rainfall, or both, in a comparatively short space of time, without flooding or inconvenience.

The normal and maximum flow of sewage may be determined within certain limits, but the rainfall will vary very considerably and cannot be determined with any degree of accuracy.

The proper amount of water necessary for strictly domestic purposes has been variously estimated at from twenty to thirty-three gallons per day for each person, and this amount may be taken as the normal amount of sewage to be taken care of. Half of this amount will probably pass into the sewer in six hours, and two-thirds in eight hours.

The maximum volume of sewage will occur when a number of fixtures are discharged simultaneously, which, in a small building, is a somewhat remote possibility.

Assuming that a bath tub containing fifty gallons of water, a water closet tank containing four gallons, a laundry tub containing twenty gallons, and a slop sink into which a two gallon pail of slops is thrown and which is then flushed, are all discharging at the same time, we have a total of about eighty gallons of water (sewage) passing into the sewer in a brief space of time, probably not more than two minutes. By Table 4 it may be seen that a four-inch sewer, with an inclination of 1 in 40, and running full, will remove, approximately, 176 gallons of sewage per minute, or more than four times the volume which would be likely to be discharged at any one time from the combined fixtures of a building of moderate size. And yet, in the majority of instances, a sewer of a larger size would usually be provided for such a building. It is not wise, however, even when no rainfall is to be taken care of, to construct a sewer of less diameter than four inches, and this size is frequently stipulated in plumbing codes as the minimum size which will be approved. On the other hand, it is seldom that a size larger than six inches will be required for any ordinary building, and when this is the case, and there are considerable fluctuations in the volume of sewage, it would be better to use two sets of pipes of a small diameter than one large sewer, and for the following reasons:

TABLE 4.

Approximate inclinations of circular sewers for securing velocities of four and one-half feet of sewage per second, when the sewers are running full or half full. Also the approximate discharge, in U. S. gallons, per minute.

Size of sewer.	Inclination.	Discharge.*
4	1 in 40	176
5	1 in 50	275
6	1 in 60	397
7	1 in 70	540
8	1 in 80	705
9	1 in 90	892
10	1 in 100	1,102
12	1 in 120	1,586

*When the sewers are running only half full the discharge will be one-half the amounts shown.

Up to a certain point the velocity of the sewage will increase with its depth in the sewer, and the depth of the sewage will determine its power to carry along the solids usually present in the sewage, or which may accidentally or through carelessness find their way into a sewer.

A comparatively small volume of sewage which in a four-inch pipe might be sufficient to render it self-cleansing would be a shallow stream in a six-inch sewer, and a trickling stream in a sewer of larger dimensions.

As previously stated, where the rainfall is to be removed by a sewer, it will be necessary to make the sewer large enough to remove a considerable quantity of water in a short space of time, the amount depending upon the size of the roof, or the

*First and second installments were published February 2 and 16.

size of that part of the lot which may be paved, and which may be drained into the sewer.

The amount of rainfall is measured by means of a special gauge, one or more of which, together with the records of the local rainfall, will usually be found in every locality of any size, and is expressed in inches, and in tenths and one-hundredths of an inch. A rainfall of one inch is that amount of rain which falling upon a given surface, and not being diminished by percolation or evaporation, would have a uniform depth of one inch.

In making an estimate of the amount of water which will fall upon a roof, or lot, during any rainstorm, it will first be necessary to learn the amount of the rainfall, in inches, and the area of that portion of the lot covered by the building, or which may require to be drained, in square inches, and by multiplying these two numbers the number of cubic inches of water will be found. This may be converted into gallons by dividing by 231,—the approximate number of cubic inches in a standard U. S. gallon of water. For example, a building 50×25 feet would have an area of 1,250 square feet, or (1,250×144) 180,000 square inches, and 180,000×1 inch of rainfall will equal 180,000 cubic inches, or (180,000÷231) slightly more than 779 gallons of water.

In Michigan the average annual rainfall is about 33.76 inches, or about 2.8 inches per month. If the downfall of this amount of rain was uniform, the amount per day would be less than one-tenth of an inch, and need not be considered in the calculations for the sizes of private sewers.

In the planning of sewerage systems for localities it has been the custom of some engineers to provide for a rainfall of one-quarter of an inch per day, but even this amount would not require more than a passing consideration in the planning of the sewers of individual buildings. Neither would it be considered necessary to make provision for taking care of all the water in excessive downpours of rain,—as two and one-half inches in forty-five minutes,—because a considerable portion will overflow the roof gutters and find its way into the subsoil or the street channels.

In the planning of private sewers into which the rainfall is to be admitted, I would suggest the standard of one inch of rainfall per hour as the maximum amount to be provided for, and such a rainfall could be removed from the roof or lot of any ordinary building, without inconvenience, by a properly constructed four-inch sewer.

In some localities two sets of pipes are laid for the separation of the sewage and rainfall; in others the rainfall is collected and stored in cisterns —some of which have overflows to the sewers; and in many others, particularly in the large cities, the rainfall is removed principally by the sewers.

From what has been said it will be seen that calculations for private sewers, based upon the actual amounts of sewage and rainfall to be taken care of, will be very unreliable and subject to wide variations, even in the case of buildings of the same size and with the same class and number of plumbing fixtures.

For those who wish to make further study of this phase of our subject it is suggested that a number of buildings of each of several classes, and provided with water meters, be selected for extended observations. Averages of the amounts of water used per day for each occupant, the number of hours the buildings are occupied, and the amounts of rain falling in a given time upon the roofs, or other surfaces drained, would furnish valuable information relative to the probable amounts of sewage to be provided for in buildings of similar size and class.

In the new plumbing code of the city of Cleveland, Ohio, the number of fixtures is taken as the basis of the sizes of private sewers, as shown in Table 5.

TABLE 5.

Minimum sizes of metal house sewers, for sewage and rainfall, in terms of the maximum number of small fixtures, or their equivalents for larger ones, that may be connected therewith, when laid at the grades indicated. For crock house sewers the diameter is to be one size larger for the same number of fixtures.*

Size of sewer.	Inclinations. 1 in 100.	2 in 100.	3 in 100.	4 in 100.
4.....	118	163	196	238
5.....	216	300	364	435
6.....	343	488	585	731
7.....	474	722	860	1,060
8.....	716	1,000	1,190	1,400
9.....	950	1,334	1,616	1,891
10.....	1,216	1,750	2,050	2,433
11.....	1,585	2,250	2,515	3,133
12.....	1,950	2,725	3,310	3,900

*Twenty square feet of roof or yard area, in horizontal projection, counts as one fixture.

Three feet of urinal trough, or wash sink, counts as one fixture.

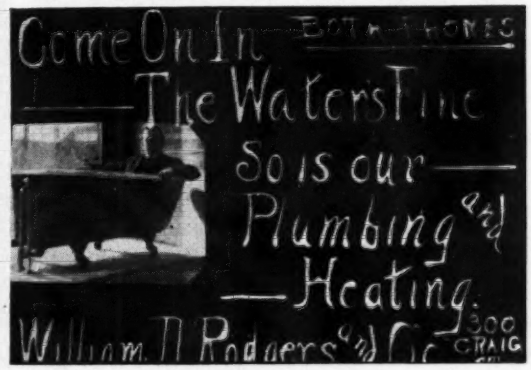
One bath, basin, sink, or smaller fixture, counts as one fixture.

One pedestal unrinal, or slop hopper sink, counts as two fixtures.

One water closet counts as two fixtures.

The inclination of a private sewer will depend largely upon the depth of the main sewer, and the distance of the latter from the highest part of the private sewer, and will vary considerably in the same sewer district. Where the total amount of fall is slight, the head of the sewer should be as

near to the surface of the ground as possible without running the risk of freezing, and where the amount of fall is excessive, the head of the sewer should be kept as low as practicable, or the sewer should be given a safe and uniform inclination to a point near to the main sewer and the inclination increased at this point.



A novel form of advertising employed by Wm. D. Rodgers & Co., contracting plumbers, of Schenectady, N. Y.

It is the unanimous opinion of engineers that the inclination of private sewers should be such as will cause a velocity of about four and one-half feet of sewage per second, and, for this reason, Table 4 has been limited to those inclinations which will give this velocity, or nearly so. These inclinations may be easily remembered by multiplying the diameter of the sewer by 10, the product being the length of sewer, to which one foot of fall should be given.

TABLE 6.

Size of sewer.	Minimum inclination.
4	1 in 92
6	1 in 137
8	1 in 183
9	1 in 206
10	1 in 229
12	1 in 227

Where the inclination of the sewer must, of necessity, be small, so that the velocity of sewage would be less than three feet per second, the sewer would not be considered self-cleansing, and special means for flushing would be necessary to prevent an accumulation of deposits of solid matters. Table 6 shows the minimum inclinations for self-cleansing sewers when running full or half full.

(To be continued in issue of March 16. All rights of republication reserved.)

A small boy's explanation of how lead pipe is made: "You take a long straight hole and put lead around it."

Swimming Pools*

BY JNO. K. ALLEN

Mem. Am. Soc. Inspectors of Plumbing and Sanitary Engineers; Assoc. Mem. Am. Soc. Heating and Ventilating Engineers

(Continued.)

SANITARY CONDITIONS.

THE WATER SUPPLY must be free from organic or inorganic impurity. It should be copious enough to permit frequent, daily if possible, change of water in the pool. In one pool, beautifully clean, where the bathers average 2,250 a month, the water is changed twice a week. The frequency of change will depend on the number and character of the bathers. The water should be filtered. One has but to compare a pool containing filtered water with one filled with unfiltered water, instantly to note the difference. Unless the water supply is of exceptional purity and cleanness, the body of unfiltered water in the pool will seem like a weakened solution of ink, while the filtered water has a beautiful translucent opaline tint which is entrancingly inviting. Stringent provisions must be enforced to prevent careless fouling of the water by bathers. Spitting should be prohibited. Urinal accommodations should be provided to be invariably used by bathers before entering the pool. If possible to adopt a system of water supply and heating by which currents shall be maintained in the pool the water will be aerated and kept in better condition. Surface impurities must be removed. The pool should be frequently emptied for cleaning, and, because standing bodies of water cause slimy deposits, the walls should be of perfectly smooth, impermeable surfaces, unbroken by wall chases or pockets. No pipe coils or standing overflows should obtrude into the pool. In swimming matches obtruding objects are very objectionable. A coping, rising two inches above the room floor should prevent washings from the floor from running into the pool.

Great care should be exercised to guard against the infection of the water by persons supposedly afflicted with cutaneous, venereal, infectious or communicable diseases. Hygienic considerations require that a rigid scrutiny should be made of all bathers. Habitues of the bath should be required to show a decent regard for modest proprieties of life and for the rights of other bathers. This form of a spittoon (Fig. 6), flushed and connected with the sewer, was designed especially for swimming pools.

*Copyright by "Domestic Engineering." The first instalment was published February 16.

TEMPERATURE. The temperature of pools varies with the requirements in each case. For general swimming pools where the bathers remain in the water for long periods, the temperature should be from 70° to 75° Fahr. For cold plunges the temperature may go so low as 65°. Much lower makes too great a demand on the body's vitality. The temperature of the room should be 82° Fahr.

Fig. 6.

LIGHTING. A dimly lighted room invites uncleanness, and that cannot be tolerated in a swimming bath. A well lighted room asists the tonic effect, both mental and physical, which should result from a plunge. The healthful effects of sunlight have been well pointed out by Koch, who states that the tubercle bacillus is killed by the action of direct sunlight in a time varying from a few minutes to several hours, depending upon the thickness of the layer [of substance] exposed. Diffused daylight also has the same effect although a considerably longer time of exposure is required. Duclaux says that sunlight is one of the most potent and one of the cheapest agents for the destruction of pathogenic bacteria, and that its use for this purpose is to be remembered in making practical hygienic recommendations.

On this same subject M. J. Rosenau, M. D., of the Hygienic Laboratory of the United States Public Health and Marine Hospital Service, says:

"Sunlight is an active germicide. It destroys spores as well as bacteria. The importance of the sun's rays in destroying or preventing the development and growth of micro-organisms in nature cannot be overestimated. . . . Even diffused light retards the growth and development of micro-organisms, and if strong enough may finally kill them."

The handbook of the German Imperial Board of Health says of sunlight: "Light, which illuminates the most remote corner of a room, impels us to cleanliness and destroys many of the minute bacilli which are the causes of decomposition. putridity and disease. On the other hand, dirt and dust easily accumulate in dark rooms."

VENTILATION. The moist, humid air of a swimming bath easily becomes offensive unless frequently renewed by ventilation. To be sure the human occupancy of a swimming bath bears such a small ratio to the cubical contents of the room, that the problem of ventilation is an easy one, but the air should not be allowed to become "dead."

MECHANICAL INSTALLATION.

WATER SUPPLY. The water supply piping connected with a swimming pool is not complicated, and what there is of it is necessarily connected with the heating of the water. The piping must be designed so that water may be introduced into the pool either cold or warm. The pool may be constructed so that the water supply and the waste shall be located at the end having the greatest depth, or the waste may be at the lowest point

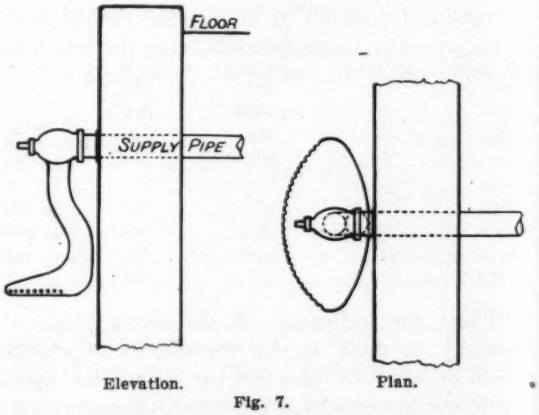


Fig. 7.

of the pool, and the supply may be brought in at the opposite end. If more convenient, the supply may be brought in at either side and the waste may be taken out at the other side, but some consideration should be given to securing an equable circulation of the water so that there shall not be a "short circuited" current of water from the supply directly to the waste.

The lowest point in the pool should be constructed with a gutter, either pitched toward the corner, if it is more convenient to have the waste pipe taken from there, or pitched toward the center if it is desired to take the waste from that point. If more convenient the lowest point in the pool need not be at the extreme end, but may be nearer the center. The location of the waste will be determined by the construction of the heater room, in which all controlling valves should preferably be

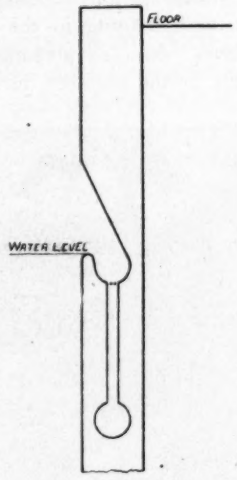


Fig. 8.

placed. It may be that the form of the building in which the pool is placed will not permit the heater room to be located at the lowest end of the pool, in which case it may be placed at either side, the waste and supply being piped into the end having the greatest depth. Flush with the bottom of the lowest point of the pool a brass strainer should be placed over the entrance to the waste pipe, preferably with a convex top, preventing the entrance of foreign matter into the waste pipe; if convex it does not permit the outlet to become covered up. The waste pipe should be large, 6″ or 8″ being ample for most pools. The waste pipe is carried downward far enough to pass under the retaining wall of the pool. It is then disposed of in accordance with one of a number of plans which will be shown later. Its general treatment is to have placed upon it a gate valve which, when open, allows the water to flow from the tank. A running trap is placed on the waste pipe with clean-outs accessible from the floor. This running trap prevents the air from the sewer from entering the pool when it is empty and it may be vented if desired.

The Overflow. At the proper height to retain the desired depth of water in the pool, an overflow pipe is taken off, the entrance to it being covered with a convex brass strainer. The overflow pipe should be 3″ or 4″ in diameter and should enter the waste pipe between the draining valve and the running trap. No standing waste and overflow should be permitted. The scum which collects on the surface of a used tank is not removed by an ordinary overflow. A surface spray has been designed and installed in a number of pools which is helpful in removing the surface water of the pool. It is shown in Figure 7. It is supplied with cold water, placed at the shallow end of the pool, 15 to 18 inches above the water level. When turned on it causes a gentle surface movement toward the overflow and removes the scum.

A form of gutter overflow surrounding the entire pool at the water level is shown in section in Figure 8. It is channeled from marble or can be made of copper set into the facing wall, or be made of enamelled brick. One and one-half inch wastes, guarded with brass strainers, are placed in the bottom every 15 or 20 feet, the waste pipes leading into a general 4″ waste pipe surrounding the pool or being carried individually into the main overflow pipe above the trap, as may be most convenient. This form of overflow is very efficacious in keeping the pool clean all the time, as the action of the bathers constantly agitates the surface and causes the surface water and its impurities to be removed.

Methods of Heating. Several different methods of heating the water may be used, that being adopted which is most available. If the pool is constructed in a building in which there is a high pressure steam plant, the water may be heated in one of two ways,—either by the injection of live steam into the water (either into the tank itself or preferably into a mixing pipe before the water reaches the tank) or by a feed water heater or other type of heater using live or exhaust steam as the heating medium. If no exhaust or live steam is available the water will have to be heated by some type of a hot water or steam heater. Illustrations will be given of many varieties of installations, so that the reader will find some one type of construction which will meet his problem.

(To be continued in March. All rights of republication reserved.)

"Re-sealing and Anti-Syphon Traps Versus Back Venting"*

BY H. J. LUFF

Sanitary Engineer, Cleveland

AS the American Society of Inspectors of Plumbing and Sanitary Engineers is organized primarily to bring about uniform laws governing the installation and maintenance of plumbing and house drainage, and methods of their enforcement, the question of re-sealing and anti-syphon traps should be studied by them in their relation to their legitimate permissible or compulsory use in a code of building sanitation. First of all, it should be borne in mind that a code of building sanitation to stand the test of its legality in the courts must be drawn so as to require only the minimum safety; otherwise it is likely to be declared illegal should anyone be disposed to attack it. It should be possible to give a valid and consistent reason for every requirement contained therein. The requirement that every fixture directly connected with the drainage system should be trapped and a safe method of maintaining the trap seal against syphonage and evaporation for a reasonable length of time, is unquestioned. But there is a decided difference of opinion as to which method of maintaining the trap seal is the most reliable,—back venting or re-sealing and anti-syphonage trap construction,—and also a difference of opinion as to the volume of water necessary to guard against complete evaporation of the trap seal during the average length of absence in the summer months. I propose to demonstrate that venting of fixture traps is not absolutely reliable as to its first installation, and that after it has been used for a period of a few years it is absolutely unreliable; also to demonstrate that the vertical soil and waste pipe stack with the lateral branches extending not to exceed ten feet with waste pipe undiminished in size so as to admit of the greatest self-cleaning action, with the use of re-sealing and anti-syphon traps, is a safer method of construction than plain traps back vented.

Back Venting Not Absolutely Reliable.

First, back venting, though the greatest care may be taken to make the connection to the waste pipe in the most approved manner, viz., taken off at an angle of 45 degrees beyond the crown of the trap, in its installation, is liable to be rendered non-efficient from the following causes: Where galvanized iron pipe is used the galvanizing may form a film which would completely stop the pipe. In the use of lead or cast iron, the molten metal may enter the pipe through the joint when it is being made, and partially or completely fill it. Oakum placed in the pipe to prevent building material from falling into it may be forgotten and allowed to remain, thus completely stopping the pipe, and if the ends of vents are not protected during construction, building material may fall into them, and, lodging in the elbows, completely stop them. All this presupposes carelessness on the part of the plumber, but constitutes a factor which cannot be ignored, as it too often exists. After the vent pipes have been installed, there are conditions over which the plumber has no control that operate to render the vent pipe non-efficient, viz., the freezing of the roof outlets in protracted cold weather, the building of nests by the birds, and the falling of leaves into roof outlets. Also the greasy vapor from the discharge of kitchen sink waste rising in the vent pipe, and the discharge of greasy sink waste where the waste pipe is partially, or entirely, clogged, rising in the vent pipe to the height of the water in the sink, leaves a deposit of grease on the cold vent pipe, gradually stops it up entirely. Also, there is the proposition of the average plumber clearing the sink waste pipe by means of an opening into the waste

Officers of the National and Ohio State Associations of Master Plumbers at the recent convention held in Columbus. From L to R are: A. C. Eynon, ex-president of Ohio State Association; R. B. Moodie, president of the National Association; Wm. Haas, secretary of the National Association and Edw. H. Morgan, president of Ohio State Association. Photograph by our Mr. Winslow.

*Paper read at the second annual meeting of the American Society of Inspectors of Plumbing and Sanitary Engineers, held at Cleveland, Ohio, on January 8-10, 1907.

pipe and leaving the vent untouched, or of trying to force the obstruction from the waste pipe and forcing what might be in the vent pipe up against an elbow beyond the point of accessibility, or of using a blind washer on the back vent union and forgetting to take it out. Then there is the added danger of piping through which no water passes to indicate a leak, should one exist, and those of us who have made smoke tests of buildings that have been in use for a few years know to what an alarming extent this danger exists; and it is the part of wisdom to reduce it to a minimum.

The Re-sealing or the Anti-Syphon Trap.

As the fixture outlet is an open end plus the trap seal and the back vent pipe cannot be relied upon, it naturally follows that to be on the safe side every trap ought to be either a re-sealing trap, if placed where the discharge of fixtures above it does not exceed more than two-thirds of the area of stack into which it discharges and the vertical discharge is only of sufficient length to permit of a re-seal to a standard depth and volume; or an anti-syphon trap where the discharge of fixtures above it exceeds more than two-thirds of the area of the stack.

It has been very gratifying to me in discussing this proposition with intelligent, up-to-date plumbers throughout the country, to find so many who believe that properly constructed and tested re-sealing and anti-syphon traps at a limit of ten feet from the stack, without back vent, is a much better construction than other traps back vented. This leads us up to the proposition of the standard of trap construction which is applicable to all forms of traps, viz.: They must be free from secret partitions through which, in case of defect, the trap seal could leak into the waste pipe unobserved, or sewer air leak into the room above the trap seal; they must be self-cleaning,—that means free from deflectors or pockets that would retard the natural flow of the waste water. It is conceded by those who have given the matter careful study that a trap that would be satisfactory under a wash bowl, bath tub, wash trays, urinal, etc., would not be satisfactory for self-cleaning action under a kitchen sink discharging greasy waste water, so that when the trap placed under a kitchen sink is other than an approved grease trap, or a plain trap, it should be equal in self-cleaning action to the plain trap. This can be accomplished by using only a drum trap with a tangential inlet. It is apparent that there should be a fixed standard of diameters and inlets for drum traps, and the following is, in my judgment, a satisfactory one:

Every inlet to a drum trap shall be either through the bottom or on the side on a line with the bottom, so as to prevent any sediment pocket, and shall be either tangential or bell shaped. The diameter of a drum trap provided with a bottom or side inlet shall not be greater than twice the diameter of the inlet. The clearance between the outer shell of a drum trap and the standpipe forming a center outlet through the bottom of the drum, shall not exceed the diameter of the inlet.

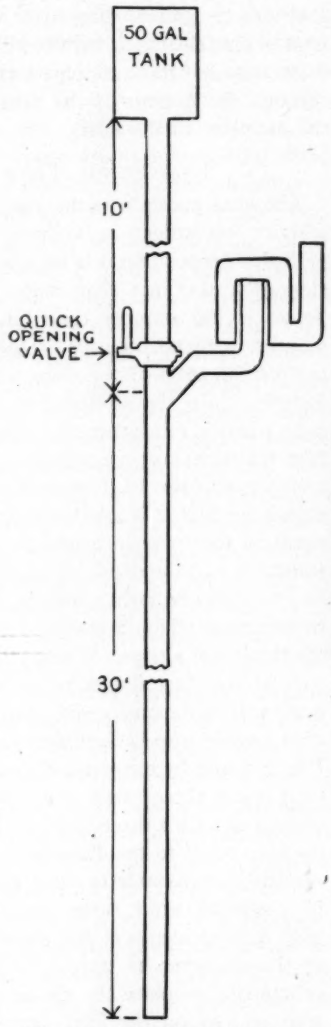
Evaporation From Traps.

The next question is the standard for a depth of seal, or equivalent in volume, and in connection with this proposition it is necessary to take into consideration the fact that many people leave their homes in the summer time for from one to three months, with no thought of the effect of evaporation on the seals of the traps under their plumbing fixtures. (In the winter time if they leave home they usually remember the effect of freezing and take the necessary precaution.) I have found that a safe estimate of evaporation is one inch per month, so that it is advisable that a positive re-seal equal to the three-inch seal in a plain trap be the standard, and the depth of such re-seal should never be less than one inch. Another feature in trap construction on which a standard should be adopted is the minimum amount of superficial surface. It is a well known fact that a re-sealing and anti-syphon trap must have considerably more superficial surface than a plain trap back vented to prevent syphonage. I have found by experiment that this amount can be kept below three times the superficial surface of a plain trap with a three-inch seal and a space between the trap equal to the diameter of the trap, so that it would be reasonable to limit the superficial surface in a trap to three times the same size plain trap with a three-inch seal and space between trap equal to the diameter of trap. While it is desirable if practicable to place the cleanout of the trap in the trap seal or on the inlet side of trap, it is by no means as essential as some maintain, but when located on the outlet side of the trap it should be restricted to a maximum distance of the diameter of the inlet from the top of the outlet to the under side of cleanout screw. This would permit of a pressure on the cleanout screw sufficient to indicate a leak should one exist. While it is possible to prevent trap syphonage by increasing the size of the waste pipe, and many plumbers resort to this method, the largely increased fouling surface thereby added, with the possibility of a gradually decreasing diameter from the deposits on its sizes,

would suggest the advisability of using re-sealing and anti-syphon trap construction and the same size waste pipe.

Satisfactory Test of a Trap.

This brings us up to the proposition of a satisfactory test to require a re-sealing and anti-syphon trap. If we establish the distance that a trap may be placed from the ventilating stack as ten feet and allow that ten feet to be horizontal or vertical, and re-sealing trap to be used where the discharge of the fixtures above does not exceed two-thirds of the area of the stack, it naturally follows that the following test is a safe one for re-sealing traps:



Scheme of Trap Testing Apparatus.

Place on trap inlet a bow-shaped tank sufficient to hold water enough to fill thirteen feet of pipe the size of trap to be tested. The outlet from tank to be full bore, trap to have a vertical discharge of the same size pipe as the trap, and ten feet in length. After the discharge of tank contents the seal retained should not be less than one inch in depth and the volume of water not less than the full three-inch seal in a plain trap. No movable parts will be allowed in trap when test is being made. If an anti-syphon trap is to be used where the discharge of fixtures above may completely fill the stack, it naturally follows that the test required should be as severe as the severest condition that is likely to exist in drainage construction. We will suppose that sets of wash trays without overflow are placed above each other and discharging into the same stack, the roof outlet is frozen over or clogged from other causes, the discharge of the two topmost fixtures uniting are sufficient to fill the stack, and passing by the fixtures trap below produce a strong syphonic action on this trap; and that at this time the plugs are placed in the wash trays above simultaneously, the water in the trap below will be thrown into violent action, differing from that caused by the steady downward pull with an open end above. While this condition may seem improbable, it nevertheless is not impossible, so that the test required for an anti-syphon trap should be severe enough to cover

A Contented Group.—Delegates to the recent annual convention of the Kansas State Association of Master Plumbers, held in Topeka on February 4, lounging about the lobbies of the Throop Hotel, between sessions. Photograph by our Mr. Winslow.

such a possibility, and the following test would, I believe, prove a safe one:

Place a fifty-gallon tank ten feet above the trap connection, connect the trap to a Y connection on a vertical pipe no smaller than the trap outlet and drop from this point thirty feet. The entire pipe shall be vertical and full bore throughout. Place a quick opening valve on the pipe above trap inlet. The entire contents of the tank, fifty gallons of water, shall be discharged through this pipe by opening and closing the valve every five seconds, after which test the seal retained shall not be less than one inch in depth and the volume of water not less than the three-inch seal in a plain trap. No movable parts will be allowed in trap when test is being made.

"Do you use the block the system on this road?"

"Oh, yes, sir."

"Then I'll travel on the other."—Baltimore American.

Do We Trap Too Much?

At the meeting of the Glasgow and west of Scotland District Council, for the national registration of plumbers on January 17, 1907, Gilbert Thomson, M. A., F. R. S. E., C. E., read a paper the title of which was the question quoted above. Inasmuch as Azel Ames, M. D., an eminent American sanitary expert, in a paper published in "Domestic Engineering" for February 9, 1907, raised this same question, it will be well to consider Mr. Thomson's statements on the subject.

He introduces his paper by stating that in 1878 and thereafter for some time two traps with an air space between were considered necessary on the house drain, so that if a wandering microbe managed to get past the first trap he might escape through the disconnection between the traps rather than attempt the passage of another trap. This complicated double, disconnected trap has now been simplified into a single trap with ventilation. This trap Mr. Thomson refers to as "the first line of defense" shielding the house from the entrance of dangerous germs from the sewer. Its use was based on the assumption that the air contained in the common sewer is much more dangerous than the air contained in a house drain.

The English Double System.

In English practice, Mr. Thomson points out that there is a set of pipes and fittings whose purpose it is to deal with excretal matters, which, in the case of some diseases, are presumably dangerously infected. There is also another set of pipes and fittings which deal with waste water which has been used for washing the person, clothing, utensils or dwelling, assumed to be much less dangerous, as it is free from direct excretal matters. Mr. Thomson now points out that because of these conditions we have three sets of traps:

(1) The trap between the sewer and the house drain, of which there is, as a rule, one for each house;

(2) The traps between the drain and the waste pipes, of which there may be a considerable number in a house;

(3) The traps of the individual fittings, one trap for each fitting.

Too Much Trapping?

These, according to Mr. Thomson, constitute the "three lines of defense," and he wonders if the protection afforded by them is not received at the cost of worse evils than they protect against. He assumes that:

(1) However good a job may be made of drains, soil pipes and waste pipes, **the shorter the length that we have of these, the better, as any danger is in proportion to the length of the pipe which causes it.**

(2) **Traps are at the best a necessary evil, holding as they do a quantity of dirty liquid and checking the flow of the drain.**

In considering this question, Mr. Thomson says he is not disposed to allow any weight to assertion unaccompanied with reason, and the fact that these traps are required because it is in the by-laws is not at all convincing, because he states that he knows of no by-laws which are even approximately up to date, and that many are a serious drag on sanitary progress.

Traps on Individual Fitting.

Mr. Thomson sees no reason just now for omitting traps on individual fittings, one trap for each fitting, which he terms the inner life of defense, believing that we have not yet got the inside of our pipes so clean that we would be willing to allow them to convey air into our houses. "Whatever the future may have in store, the trap at the fitting is necessary, and, furthermore, should be so placed as to have a minimum of surface on the house side of the trap."

Traps Between the Drains and the Waste Pipes.

Mr. Thomson says the very reason which would lead him to retain the trap on the individual fitting is the reason why he would do away with the other traps, saying: "We use the trap at the fitting to keep out every particle of air which has come through the pipes, and we trap the wash basin just as decidedly as we trap the closet. In that respect we admit no degrees of comparison. The air in the one pipe is bad; so it is in the other; but all the other traps on the system are based on degrees of comparison."

We keep the sewer air out of the drain.

We keep the drain air out of the waste pipes.

We keep the soil and waste pipe air out of the house.

Mr. Thomson now asks: **"If we can do the last effectually, what does it matter about the others?"** and he pertinently says: "We are not going to live in the drain or in the waste pipe, so that the danger, if any, only begins when the gases escape from the pipes into the house. If, therefore, we can keep all the gases out, it does not matter whether or not one is more dangerous than another."

The system of multifarious trapping is based on the assumption of the degrees of danger, accompanied by an assumption which Mr. Thomson says was only too correct in 1878, but which, to the credit of the plumbers, is no longer so. In 1878 it was assumed that the plumbing work would be of such a poor character that the chance of gases getting from the pipes into the house was great. In 1878 it was accepted as a matter of course that drains, soil pipes and waste pipes were very doubtfully constructed, and while it was hoped that they would not leak, everything was done to minimize the evil results which might accrue from any leak. "Nowadays," says Mr. Thomson, "it is different," and with plumbing tested by pressure he does not care whether a pipe which passes through his bedroom ventilates the common sewer or only a wash basin.

He thus characterizes the second portion of the trap-piping system, his "second line in defense," the traps between the drain and the waste pipes, as entirely unnecessary.

The Trap on the House Drain.

Mr. Thomson points out that this trap, although it has been constantly used for many years, has not been used without criticism. In 1895 Mr. Aitken, of Greenock, made a strong attack upon it at the congress of the Sanitary Association of Scotland, claiming that the gases from one drain, when any water passed down, were discharged about the pavement, very likely under the noses of passersby or children playing, and he showed by experiment with large gas bags that there was, in fact, such a discharge. At the congress of the same association held at Kirkcaldy in 1902 Dunlop Brown, county sanitary inspector of Buteshire, objected to this trap, his main objection being that it added greatly to the difficulty of ventilating the sewers. Within a few weeks Peter

Fyfe, a Scottish inspector, read a paper to the western branch of the Sanitary Inspectors' Association of Scotland, indicating an open mind on this question of the running trap. Dr. Butler, medical officer of health, Willesden, England, two or three years ago gave some very startling particulars of the number of choked manholes which he had discovered in the course of a systematic inspection. He has recently had his objection to the intercepting manhole, which is used in London as an equivalent of a disconnected trap, much strengthened by the result of further investigations. The English local government board is now investigating the subject of the main trap on the house drain.

An afternoon in the park. An episode of the recent Ohio State Convention, held in Columbus on February 12-13. From left to right are J. H. McCormick, of the H. Mueller Manufacturing Company, of Decatur, Illinois, and Harvey Burckhardt, the popular representative of the John Douglas Company, of Cincinnati, Ohio. Photograph by our Mr. Winslow.

Mr. Thomson thus specifies his opinion on the subject: In favor of it he says that **it cuts off the house drains from sewer gas and sewer rats. It is convenient for testing.** Opposing it, he says **it completely stops sewer ventilation by means of the soil pipes. It offers a possibility of obstruction; it offers an opportunity for the escape of bad gases.** With reference to the danger from the sewer, Mr. Thomson says this only exists if the interior defense is defective, either through faulty pipes or ineffective traps.

While he says that his position is not unfairly called "sitting on the fence," because the arguments for and against seem to be quite evenly balanced, he says if he had control over both the public and private systems of drainage, and could therefore satisfy himself that the sewers were well laid and clean and that the drains were thoroughly sound, **he would be inclined to abolish the disconnecting trap on the house drain.**

In connection with the office of ventilating the sewer, which, with the trap absent, the soil pipes would perform, he says that we are frequently told that the ventilation of the public sewer is a matter for the public authorities, not for the individual, as if the two were necessarily distinct and antagonistic; and he assumes that this is faulty reasoning. He says: "I scarcely think that the time is ripe for the common adoption of the latter method [ventilating through the soil pipes], but I expect it will come, and I would deprecate any by-laws which do not take this into account. **I do not think that even now any one should be compelled to use this trap if he can show his drainage system is of a sufficiently high quality, and takes the risk for his own household only.**"

Traps Disconnecting Waste Pipes from Soil Pipes on Drains.

Here Mr. Thomson says he will not "sit on the fence," but describes the English system as (in a sanitary sense) a relic of the dark ages. Thirty years ago conditions which led to the introduction of disconnection fully justified it. This disconnection system simply meant that pipes originating in places where there was no foul matter and conveying nothing but waste water were not allowed to connect with any soil pipes or drains, but had to pass through the open air. Now conditions are not the same, and, as tight pipes are possible, the present requirement of this system of disconnection is almost equal to an insult to the plumbing trade. "Given good material and reasonable time, I question," says Mr. Thomson, "if there is a single practical plumber who would not willingly undertake to fix pipes and make joints to stand any test and remain tight."

Referring to the syphonage and evaporation of traps, Mr. Thomson says that **syphonage should never be possible with proper ventilation, and may at once be dismissed.** He says **evaporation is not possible in the case of a sink, scarcely possible in the case of a basin, and not likely in the case of a bath,** when used for its primary purpose. It seems rather a case of saddling the wrong horse to make the whole population multiply traps and pipes to protect a certain careless minority from the consequences of their own dirtiness. If the present English system of disconnection is done away with it would often reduce the length of dirty piping by about one-half, and the number of traps would be reduced in greater proportion, and thereby the dirty liquid which is now kept lying about the house, and the puffs of gas which escape water which is now distributed among a number of pipes would be concentrated into one. The standard of workmanship would be improved. The common practice of ventilating traps by pipes ending just through the wall, from which any gases may freely blow from windows into the house, may be done away with, a great saving in cost would be made.

Mr. Thomson's conclusion is: **"We cannot dispense with traps on the individual fittings; that the main trap between the public sewer and the house drain is by no means such an essential as we have been accustomed to think. The disconnection between the drain and the waste pipes has outlived its usefulness and is now more harmful than beneficial."**

OUR READERS' FORUM

AS TO WROUGHT PIPE DRAINAGE.

A Prominent Plumbing Inspector Writes: We are about to amend our plumbing regulations in several particulars, among them being a provision to permit the installation of the "Durham" system of drainage. This is meeting with opposition on the part of the plumbers of this city, who claim that it is not nearly so sanitary and that the life of it is much less than that of the cast iron system. Knowing that Domestic Engineering is ever ready to advance sanitary plumbing along proper lines, I appeal to you for your opinion upon the merits and demerits of the system in question by replying to the following questions:

1. Has any city or state to your knowledge legislated against the use of the Durham system?
2. Is the Durham system considered better for large buildings than the cast iron system?
3. Does the life of the Durham system exceed that of cast iron, or vice versa?
4. In first class work is the Durham system used in preference to cast iron? —— —— ——

Reply.

We answer our correspondent's question first:

1. To our knowledge no city has legislated against the Durham system.
2. We think the Durham system is considered better than cast iron for buildings of the type known as fireproof.
3. We cannot say that wrought pipe drainage will outlast cast iron; nor do we know if the reverse would be true. We have never heard of a wrought pipe system going wrong.
4. If our correspondent will permit us to change the form of his question so that we may make it refer to plumbing in the buildings commonly known as "skyscrapers," we should answer yes; wrought-pipe drainage is not commonly used in small work.

Some General Observations.

About the same time that Col. W. L. B. Jenney, the Chicago architect, devised the steel-frame building, Charles Durham invented and caused to be patented a system of plumbing known by his name, consisting of wrought-iron pipe for the straight runs, screwed into threaded cast-iron fittings; so made that the pipe screwed into recessed fittings, the end of the pipe screwing up against a shoulder in the fitting; this caused the bore of the drain to be flush and of the same diameter its whole length, leaving no projecting surfaces to catch solid substances and cause stoppages. The system has been in use for more than twenty years, and has been thoroughly tried out. Writing from memory, and without access to records, we may say that there was much litigation on Mr. Durham's part to maintain the integrity of his patent, but we believe unsuccessfully.

So common has the system of drainage devised by Mr. Durham become and so little has his name been identified with its later development, that it seems best not to continue to attach his name to it, and we much prefer the term wrought-pipe drainage with flush fittings. Particularly should it be so called in drawing ordinances, because to those who are not familiar with the facts, the connection of the name "Durham" to the system specified in an ordinance would imply that some tribute would have to be paid to the owner of a patent.

"Durham" fittings are made and sold under that name by one firm who succeeded to the rights of Mr. Durham; recessed drainage fittings are made by several firms and illustrated in their catalogues.

It may be stated that but a small portion of the pipe sold as wrought iron is really wrought iron; about 70 per cent of the welded pipe sold in this country is really mild steel. In the earlier history of steel pipe there was a great deal of prejudice among fitters against it. It was hard in spots, making it difficult to thread, and in severe strains incurred while threading it frequently twisted so that it opened at the seam; it was very hard on cutting and threading tools. Improvements in processes of manufacture and in raw material used in its manufacture have greatly reduced these prejudices.

The advantages of wrought pipe for drainage are the greater strength of wrought pipe over cast iron, and the superiority of screwed over caulked joints.

The tensile strength of wrought-iron pipe (its resistance before it is torn apart) is 34,000 pounds per square inch; the tensile strength of soft-steel pipe is 61,000 pounds per square inch. The strength of the seam in wrought-iron pipe is about 70 per cent of its tensile strength, while in steel pipe it is 72 per cent. The results of many tests show that a certain size and weight of steel pipe possesses nearly twice the strength of wrought-iron pipe of the same size and weight, has about twice the working pressure and about twice the resistance to twisting.

Careful tests by Professor H. M. Howe,* of Columbia University, New York, show there is but little difference in the rate of corrosion of wrought-iron pipes and steel pipes under ordinary conditions. Of course, all wrought pipes and cost-iron drainage fittings should be carefully galvanized.

* * *

CARE OF HEATING BOILERS IN SUMMER.

Chicago, Ill.—To the Editor of "Domestic Engineering." Sir: Have been a subscriber of your magazine for some time, and am very much interested in the various articles which you publish.

There are, however, two things which I have not seen discussed in the pages of your paper.

*Metallurgy of Steel.

First, are **relative merits of round and sectional heating boilers.** There seems to be some difference of opinion among dealers as to whether the round or the sectional boilers are the better, and we would like to see this matter thoroughly discussed by your expert engineers. We believe it would be of much interest to the many readers of your paper.

The majority of the best heating engineers and contractors state that **in the summer the water should be drawn off from a heating plant and the whole system refilled with clean water and left that way for the summer.** We note in a magazine called "Everyday Housekeeping" there is an article concerning the summer care of hot water heating plants, and the writer very emphatically states:

"That **the water should not be changed,** for the very good reason that every filling with clean water causes renewed rusting and pitting of the inside of the pipes and boilers, which is avoided by not changing the water. **The water which has been in the system and has been boiled does not rust the iron, while the clean water does.** Unless water is contaminated with chemicals, any effect that it may have in rusting is due to carbonic acid gas and, perhaps, to ordinary air dissolved in it. All water, by standing, absorbs air and carbonic acid from the atmosphere on it, and becomes corrosive, but by heating merely to boiling point these gases are drawn out again and the water becomes non-corrosive. So long as the water remains in the pipes and boilers it continues non-corrosive, except so far as it may during the period of disuse in summer absorb air and carbonic acid from the small amount of surface exposed in the expansion tank. Thus, although the water, after years of use becomes discolored, the color does it no harm, and such water will have no injurious effect on the apparatus, while fresh water will immediately begin a corrosive action, which will continue until the air in it has exhausted its power for harm."

The above statement is so at variance with the opinions of others which the writer has read that I would like to know, and I am sure that the other readers of your paper would like to know, what you think on this subject.

Trusting that you may consider these questions of sufficient importance to discuss them in the pages of your valuable paper, I am,

Very truly yours,

M. B. McCarthy.

In "Domestic Engineering" for April 14, 1906, we published an article on "The Summer Care of Heating Plants," in which we said:

"All boilers, cast iron or steel, water or steam, should have the water removed which was in use during the winter season, and the system filled with fresh water up to a point where the mains and lateral branches are full. The pipes above the cellar floor and radiation in the rooms will soon dry in the interior, so there is no necessity of filling them with water, for they will not rust while dry.

"In boilers with hand-hole plates, or boilers of which the interiors can be cleaned in any way, it is well to wash them out thoroughly before refilling with cold water.

"The deterioration of heating boilers that takes place in the summer months is due, to a large extent, to sulphur contained in the soot, particularly if soft coal has been used as fuel. The water in the atmosphere condenses on the cold plates of the boiler and moistens the soot, forming in combination a substance that attacks the plates and destroys them very rapidly. Therefore great care should be exercised in removing all particles of soot from all parts of the boiler where it has adhered.

"Spray all flue surfaces with kerosene oil, or crude oil. This prevents rusting.

"Leave the feed, ash, and clean-out doors open.

"Take down the smoke pipe, clean it carefully, and leave it down until fall.

"Remove all ashes and clinkers from grate bars and ash pit.

"Paint outside surfaces with heat-proof black enamel, made for the purpose."

The foregoing advice is contrary to that given by the writer quoted by Mr. McCarthy. We should be glad to hear from our readers on this subject.

TRAPS MADE ON THE JOB.

Dover, N. H.—To the Editor of "Domestic Engineering"—Sir: If I were ten miles from the shop, required a fixture trap and had nothing but lead pipe to make it of, I would make it like the illustration which I show herewith. By packing a piece of lead pipe full of sand, ram-

ming it home tightly and plugging the ends, the pipe can be bent around a form without kinking or breaking. I have used such a trap as this several times and, in my judgment, it does not stop up as easily as the regular S trap, as there is not so much friction and it makes a deep seal. Very truly yours, **Gerald A. Scarr.**

* * *

THE NAMELESS STORE IDENTIFIED.

Claremont, N. H.—To the Editor of "Domestic Engineering"—Sir: Referring to your issue of February 2, 1907, and to the illustration of the plumbing shop which you were unable to identify, permit me to say that it is an interior view of the office and show room of the firm of W. H. Welsh & Co., Andover, Mass., and the photograph must have been taken previous to January 1, 1905, as about that date the firm moved into larger and better equipped quarters, which, I am pleased to state, retains to a greater extent the neatness and pleasing effect of the store shown in your illustration. Very truly yours,

F. S. Smith,

With Dalton-Ingersoll Mfg. Co., Boston.

WHOLESALE PLUMBING

CENTRAL SUPPLY ASSOCIATION HOLDS QUARTERLY MEETING IN CHICAGO.

The regular quarterly meeting of the Central Supply Association was held at the Grand Pacific Hotel, Chicago, on Wednesday, February 27, at 10 o'clock a. m. Several committee meetings were held on the previous day. The sessions were marked by an unusually large attendance. The meetings were consumed with the reports of various committees and the transaction of general routine business. The meeting was called to order by President John D. Hibbard, and T. B. Jenks, of Chicago, was appointed sergeant-at-arms. The Southwest Plumbing Supply Company, of Kansas City, Mo., was admitted to membership. The roll call by the secretary showed the following members represented either in person or by proxy:

ALCONA, WIS.—Plumbers' Woodwork Co.
ANDERSON, IND.—May Supply Co., by Isaac E. May.
ATLANTA, GA.—General Supply Co.
CANTON, OHIO.—J. H. McLain Co., by P. L. McLain.
CHICAGO.—W. D. Allen Co., by C. Frank Bowes; American Radiator Co., by Charles K. Foster; James B. Clow & Sons, by James McLean; Davies Warehouse & Supply Co., by W. R. Marshall; John Davis Co., by John D. Hibbard; S. Deschauer, by S. Deschauer; Federal Co., by A. D. Sanders, Jr.; Findeisen & Kropf Mfg. Co., by O. F. Kropf; Henion & Hubbell, by R. C. Mead; Holland Radiator Co., by J. E. Holland; Illinois Malleable Iron Co., by Wm. J. Akin; Kellogg-Mackay-Cameron Co., by James Mackay; Mark Mfg. Co., by C. M. Van Court; National Tube Co., by H. S. Raymond; Republic Mfg. Co., by Wm. A. Ratcliffe; J. J. Ryan & Co., by J. J. Ryan; Street & Kent Mfg. Co., by C. D. Street; Weir & Craig Mfg. Co., by James Weir; Western Plumbing Supply Co., by S. E. Young; Whitney & Ford, by Chas. A. Ford; L. Wolff Mfg. Co., by John F. Wolff; Kelly & Jones Co., by Alfred Grove.
CINCINNATI, OHIO.—Lunkenheimer Co., by David C. Jones; Murdock Mfg. & Supply Co., by John G. Murdock, Jr.; the D. T. Williams Valve Co., by D. T. Williams.
CLEVELAND, OHIO.—E. W. Fisher Co., by L. C. Radcliffe; Cleveland Plumbing Supply Co., by E. W. Steinbrenner; Kennedy Co., by W. G. Callow; Sanitary Co., by Adam Walker; Ohio Brass & Iron Mfg. Co., by W. G. Radcliffe.
COLUMBUS, OHIO.—Columbus Brass Co., by Leo Lindenberg; Scioto Valley Supply Co., by L. C. Huesmann.
DAYTON, OHIO.—Dayton Supply Co., by F. J. McCormick, Jr.
DETROIT, MICH.—A. D. Mfg. Co., by H. Romeyn Smith; Detroit Lubricator Co., by H. I. Lord; Detroit Range Boiler Co., by E. W. Stoddard; Diamond Stamp Ware Co., by D. B. Lee; A. Harvey's Sons Mfg. Co., Ltd., by James Harvey; Ideal Mfg. Co., James P. Feeley, Jr.; Sales & Broad Co., by Murray W. Sales; Seamless Steel Bathtub Co., by Eugene H. Sloman; United States Heater Co., M. G. Pierson.
EVANSVILLE, IND.—Never-Split Seat Co., by Frank Elemdorf and J. R. Goodwin.
FORT WAYNE, IND.—Knott-Van Arnam Mfg. Co.; the P. & H. Supply Co., by George Taylor.
GRAND RAPIDS, MICH.—Ferguson Supply Co., Ltd., by T. C. Ferguson; Wolverine Brass Works.
INDIANAPOLIS, IND.—Central Supply Co., by L. C. Huesman; Knight & Jillson Co., by Henry M. Stackhouse; Shirley Radiator & Fdry. Co., by J. H. O'Brien.
KANSAS CITY, MO.—Kansas City Pump Co.
KENOSHA, WIS.—Frost Mfg. Co., by W. J. Frost.
KEWANEE, ILL.—Western Tube Co., by W. H. Bruce.
KOKOMO, IND.—Great Western Pottery Co., by A. C. Conradt.
LOUISVILLE, KY.—Ahrens & Ott Mfg. Co., by S. H. Moon; Laib Co., by George Laib.
MANSFIELD, OHIO.—The Barnes Mfg. Co., by T. R. Barnes.
MILWAUKEE, WIS.—F. R. Dengel Mfg. Co., by F. R. Dengel; the Hoffmann Mfg. Co., by Aug. Seelman; Hoffmann & Billings Mfg. Co., by E. F. Niedecken; Robert Rom Co., by C. S. Waite; Rundle-Spence Mfg. Co., by F. K. Dibley.
MINNEAPOLIS, MINN.—Central Supply Co.; National Brass & Metal Co., by H. F. Hedges.
MUNCIE, IND.—George Keiser & Co.
NEW YORK, N. Y.—American Sanitary Works, by B. O. Tilden; Central Foundry Co., by J. S. Dibley; United Lead Co., by W. T. Morgan.
NOBLESVILLE, IND.—McElwaine-Richards Co., by C. E. Gates.
OMAHA, NEB.—United States Supply Co., by J. B. Rahm.
PEORIA, ILL.—Nailon Bros., by J. P. Nailon.
PITTSBURG, PA.—Anchor Sanitary Co., by H. L. Andrews; Bailey-Farrell Mfg. Co., by George H. Bailey; Duquesne Sanitary Co., by John H. Fitzgerald; Fort Pitt Supply Co., by J. M. Young; Oil Well Supply Co., by D. P. Benjamin; Pittsburg Brass Mfg. Co., by Thomas Ward; Pittsburg Valve & Fittings Co., by L. B. Jenks; Spang, Chalfant & Co., by J. D. Purdy, Jr.; Standard Mfg. Co., by C. A. Carothers; Standard Sanitary Mfg. Co., by Theo Ahrens; United Mfg. & Supply Co., by F. S. Cousley; United States Sanitary Mfg. Co., by A. H. Cline, Jr.
ROCKFORD, ILL.—Rockford Brass Works, by D. E. Treharn.
ST. CHARLES, ILL.—Glenn Mfg. Co.
ST. LOUIS, MO.—John C. Kupferle; N. O. Nelson Mfg. Co., by William Ivy; Pleuger & Henger Mfg. Co., by Barney H. Sanders.
ST. PAUL, MINN.—Western Supply Co.
SHEBOYGAN, WIS.—J. M. Kohler Sons Co., by Walter J. Kohler; Jacob J. Vollrath Mfg. Co., by Carl J. Vollrath.
TERRE HAUTE, IND.—Frank Prox Co., by W. B. Blowers.
UNION CITY, IND.—Knapp Supply Co., by P. E. Hanlin.
YOUNGSTOWN, OHIO.—Youngstown Iron Sheet & Tube Co., by George E. Day.

The Schirmer Manufacturing Company, of 9001-9009 Desmond avenue, Cleveland, Ohio, has been organized to manufacture plumbing specialties.

The Page-Hersey Iron Tube and Lead Company, of Guelph, Ont., has moved its head office to Toronto. Its iron pipe plant at Guelph is being doubled in size.

The James Robertson Company, of Montreal, Que., was visited by a fire on Friday, February 15, which damaged its lead works to the extent of $60,000. The loss was covered by insurance.

The Chicago branch of the National Metal Trades' Association will hold its meeting on March 13 just prior to the convention of the national association, to be held in Boston on March 19.

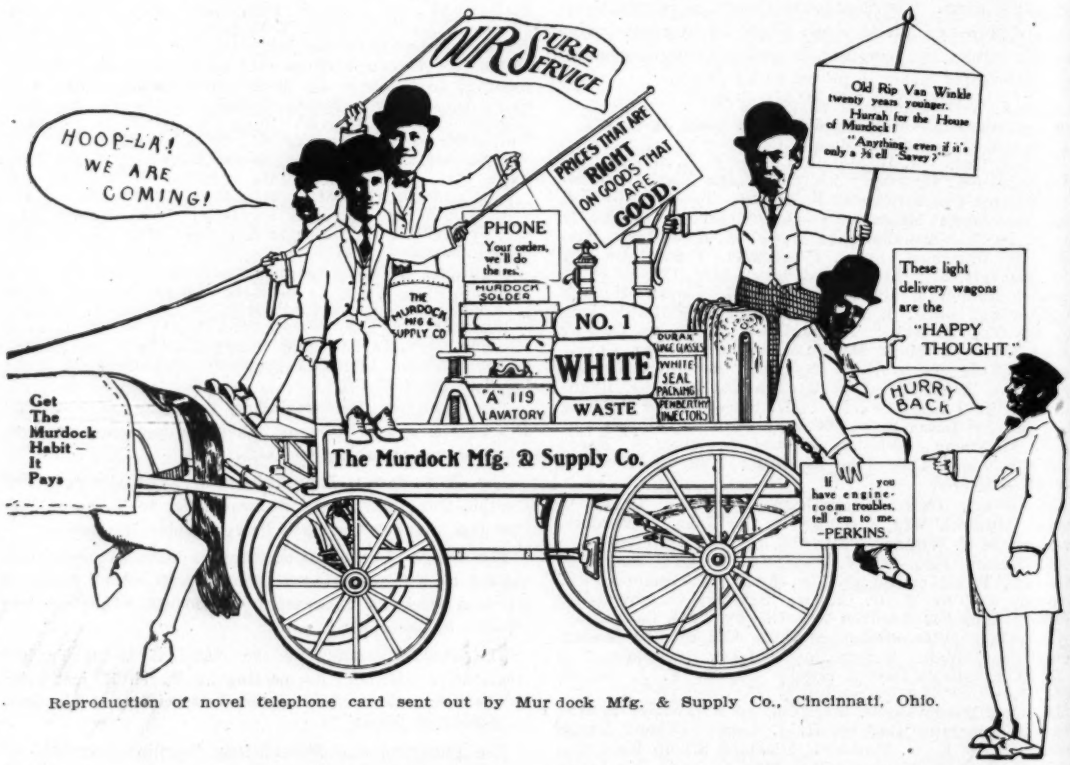
The Plumbing and Steamfitting Supplies Company, of Minneapolis, Minn., has purchased the property at 400-408 Third avenue north, and will make extensive improvements and additions to it.

The Standard Manufacturing Company, of Pittsburg, Pa., in an elaborately designed and beautifully executed announcement extends information of their opening last week Thursday, from 10 a. m. until 10 p. m. They believe this to be the most elaborate display of high-grade sanitary plumbing fixtures ever shown.

The Dalziel-Moller Company, of San Francisco, Cal., has resumed work on its five-story steel frame building on Mission street, to be occupied by its plumbing supply business as soon as it is completed. The building was under way at the time of the big fire, but construction has been delayed until the present time as a result of the disaster.

A Pittsburg firm of jobbers of plumbers' supplies has announced that, "desiring to assist the trade in their collections and make it an object to them to discount their bills and increase their trade with us, we have decided to allow a special 5 per cent cash discount on all purchases paid not later than the 10th of the following month. Lead pipe, brass pipe and factory shipments are excepted.

The Murdock Manufacturing & Supply Company, of Cincinnati, has adopted a new method for getting its goods out in Cincinnati and suburban towns. Commencing on Monday, February 25, this company started out six new wagons at stated intervals during each business day, covering the following routes: Norwood, Cummingsville, West End, Covington, Newport and Central City. These wagons are handsomely constructed and are designed with a view to taking in each of these towns and calling on each plumber and steamfitter along the routes. This is a novel method and will be run along the lines now pursued by department stores, which have been doing similar patrol duty for years.


OUR SURE SERVICE
HOOP-LA! WE ARE COMING!
PRICES THAT ARE RIGHT ON GOODS THAT ARE GOOD.
PHONE
Your orders, we'll do the rest.
Old Rip Van Winkle twenty years younger. Hurrah for the House of Murdock!
"Anything, even if it's only a ½ ell. Savey?"
These light delivery wagons are the "HAPPY THOUGHT."
HURRY BACK
THE MURDOCK MFG & SUPPLY CO
MURDOCK SOLDER
NO. 1
WHITE
WASTE
WHITE SEAL PACKING
"A" 119 LAVATORY
Get The Murdock Habit — It Pays
The Murdock Mfg. & Supply Co.
If you have engine-room troubles, tell 'em to me. —PERKINS.

Reproduction of novel telephone card sent out by Murdock Mfg. & Supply Co., Cincinnati, Ohio.

THE RESALE PRICE.

Jacksonville, Fla.—To the Editor of "Domestic Engineering"—Sir: I have read with great interest an advocacy by a New York manufacturer of the establishment of a resale price by manufacturers and the maintenance of an adequate differential for the long-suffering jobber. First permit me to thank you, sir, for the entirely disinterested efforts you have for many years put forth to benefit the jobbing trade. I am sure I reflect the feeling of most of the jobbers of the United States when I say that we are under deep obligation to you, and the circumstances are of such a character that I do not readily see how the obligation can ever be repaid. Second, I desire to say that while I understand that physical science can do much in accounting for and explaining the phenomena we see about us, still it is not clear to me how the science of psychology can be invoked by my friend the New York jobber (see your issue of February 23) to correct the evils by which we jobbers seem to be surrounded. Perhaps, however, I do not follow my learned friend. It seems to me that the successful establishment of a "resale price" and its maintenance by the jobbing trade is threatened by a lack of morality rather than mentality. I can easily grasp the mental idea that it will be a fine thing for the manufacturer to say to us that if we maintain a stated minimum price on his product he will give us a differential of 25 per cent, and that if we do not maintain the fixed resale price he will class us as retailers and give us no differential at all. This idea, I say, is simple and reasonable. But the difficulty, as it seems to me, is in its expression. How can we be made to honor our agreement not to sell below the fixed resale price? Who can make us honest to each other? Who is profound enough to draw an affidavit so binding that after we have signed it we cannot, and will not, while observing the letter, violate the spirit?

Thus it seems to me to be a moral question rather than a mental one, and morals are rather the expression

of emotion than of reason. Let the Eastern Supply Association hire "Billy" Sunday to preach and to teach morality and win us to its practice, and it will be easier to build reciprocal relations between manufacturers and jobbers. **Floridian.**

* * *

Toledo, Ohio.—To the Editor of "Domestic Engineering." Sir: So far as we have had time to read the article, "Resale Price the Corner Stone of Reciprocity," it accords with our ideas; in fact, expresses the practice which we have pursued since the inception of our company. Yours very truly,

Toledo Pipe Threading Machine Company,
W. C. Longenecker.

* * *

Hartford, Conn.—To the Editor of "Domestic Engineering." Sir: Referring to the article, "Resale Price the Corner Stone of Reciprocity," in your issue of February 16, we wish to say that we approve of "Manufacturer's" position. Yours truly,

The Plimpton & Hills Corporation.

* * *

Chicago, Ill.—To the Editor of "Domestic Engineering." Sir: We have read the article, "Resale Price the Corner Stone of Reciprocity," with much interest, and can only say that it is a truthful statement of conditions as they exist, with an outline as to theory, which would certainly improve present practice. The average jobber is inclined to overlook fixed charges and cost of doing business in the scramble for orders that realize nothing but empty glory. The article is a timely one. Very truly yours, **Kellogg-Mackay-Cameron Company,**

Jas. Mackay, Secretary.

* * *

Quincy, Ill.—To the Editor of "Domestic Engineering." Sir: I have read the article on "Resale Price the Corner Stone of Reciprocity," and the plan sounded very feasible to me at first, but after reading it a second time I came to the conclusion that it didn't figure out as well as I had at first thought, if I correctly understand the proposition. Does the resale price mean that the manufacturers set the selling price at which the jobber is to dispose of his goods? If so, then the manufacturers must have a well organized association, and I further understand that when the jobber buys from a manufacturer not in the association that he would be put on a retail basis.

In other words, buy of the association everything it makes, or they won't sell you except at retail prices. That is what would confront the jobber as I understand it. I can readily understand how specialties of all kinds may be handled in this way to the mutual benefit of all concerned, but when you try this system on staples that are easy to manufacture it occurs to me that we would be getting pretty close to the methods which we condemn in our employes when they try to force us to run a strictly union shop. If the resale proposition were put into effect on all plumbing and steam goods, it seems to me that all makers of such goods catering to the jobbing trade would of necessity have to get into the association or get out of business.

Now, suppose all manufacturers could agree on some such basis, and the specialty man and the manufacturer of the general line all got into the same association, could the specialty man sell his product at equal prices with the man who makes a full line? In other words, the manufacturer making a partial line of steam fittings would have a mighty difficult time selling his output if he were compelled to get the exact price that the big manufacturer asks; or perhaps a better example of what I am trying to get at as an illustration, if a manufacturer's line is too small to sell in carload lots, he couldn't possibly hope to compete with the manufacturer who can always make up a carload because of the extensive line which he makes. as the jobber would always prefer to buy of the large manufacturer and have his goods coming in car lots unless some inducement were made by the small manufacturer.

I like the idea of getting a fair price for what we sell; but, being a small manufacturer, the plan proposed looks very much to me as though it would work out for the benefit of the big fellow. I shall be glad to know if there is some satisfactory way of explaining away my objections to this plan, but the last paragraph of the article would seem to indicate that what I have objected to was the very purpose of the plan, as it says: "It would put a stop to the jobber fostering the specialized manufacturer who furnishes goods at cost to keep his plant running."

It occurs to me that possibly the fellow who makes a specialty of certain lines has some advantages in the way of manufacturing those lines over the fellow who makes everything.

It might do to let the specialty men manufacture for the big fellows those lines which they had been specializing, and the big fellows could then distribute these specialties to the jobbers; but as nearly everything nowadays is specialized to some extent, perhaps that would not leave anything for the big fellow to make. At any rate, I shall be very glad to hear something further on this subject, as I fear that I don't quite grasp the gentlemen's ideas, or if I do, then I certainly don't agree with them. Yours truly, **E. L. Walcott.**

WHOLESALE HEATING

The National Steel Furnace Company, of St. Louis, Mo., has been incorporated with a capital stock of $30,000.

The Gulick Heater Company, of Pittsburg, Pa., will shortly move into its new plant at Big Run, Pa., which is nearing completion.

The Smoke Consumer Heating Company, of Des Moines, Iowa, which was recently incorporated, has had plans prepared for the erection of a factory 80x110 feet.

The Instantaneous Water Heating Company's plant, patents, stock and entire business at 153 South Jefferson street, Chicago, was this week sold to F. L. Kohlhase, who will increase the equipment of the plant at once and continue the business under the same name at the old stand.

H. W. Nelson, connected with the Moline Heating and Construction Company, of Moline, Ill., for the past eleven years, has purchased the entire capital stock of the Vacuum-Vapor Company, of that city, and has assumed the active management of this latter company's business.

Owing to the establishment in Canada of several new boiler and radiator plants during the past couple of years

and the enlargement of existing foundries, prices of heating supplies have been kept down to a very low average, considering the higher prices of iron. The coming summer is expected to see very keen competition for business, as the development of the manufacturing industry has, it is estimated, caught up to the demand. The market is rapidly expanding, however.

Wm. M. Mackay, secretary of the American Society of Heating and Ventilating Engineers, has accepted the management of the Mackay Manufacturing Company, of which he has been treasurer for the past fifteen years, and has leased offices and showroom at 113 Beekman street, New York, from March 1. In addition to its line of brass goods, radiators and heating supplies, it will handle an improved construction of sectional and round heating boilers. Having designed, patented and marketed many of the leading constructions of heating boilers placed on the market during the past thirty-seven years, Mr. Mackay's judgment will be considered and accepted by his host of friends in the heating business throughout this and foreign countries, and anything that he undertakes will prove successful in every way in the future as in the past.

Among the new products to be handled extensively this year by the wholesalers are luminous and non-luminous electric radiators. The demand for these radiators since their invention about two years ago has been continual until now home-builders are calling for their installation as part of the house equipment. Among the very first large plumbing firms to handle the radiators are the Aird-Don Company, of Troy, N. Y., and the Colwell Lead Company, New York City. Both of these firms have featured the radiators during the past month by extensive window displays and illustrated their use in the model rooms at their sales houses. Electric radiators give heat from a source that is as clean and safe as an electric light. The luminous radiator gives all the benefits of an open fire and does away with all danger from sparks, smoke, gas, ashes and soot. The lumin ous radiator is appreciated most on chilly days, when it is not consistent and economical to start a fire. It can be easily carried from room to room and when connected gives immediate heat with the turning on of the current. It furnishes a comfortable warmth to dress by on old mornings and takes the chill off the bathroom. Another important feature is the fact that the electrical heat will not tarnish and corrode the bathroom metal fixtures as gas and oil heaters do. They are also used extensively in summer cottages where no regular means of heating is provided. The hygienic operation and perfect control especially adapt them for use in the sick room. The luminous radiator consists of an ornamental frame fitted with a polished copper reflector at the back and three or more large cylindrical incandescent lamps. These "lamps" differ from the ordinary incandescent lamps for lighting, being designed to transform the electrical energy into heat, which is accompanied by a cheerful glow. The incandescent filament in the "lamps" emits a powerful heat and radiates it into the room. The non-luminous radiators are provided with cartridge units, and it is a few minutes after it is turned on before it gives its full strength of heat. They are best adapted to space heating or continuous service. The body of the heater is of sheet iron with ends of cast iron. Four units stand vertically inside and when in operation the air is heated by passing over the surface of the units and the inside walls of the heater. The cartridge heater is a coil of edgewise wound resistance ribbon cemented together with an insulating compound, wrapped in a sheet of mica, and slipped into a cylindrical metal shell. The unit is strong and simple, there is nothing to get out of order, and will run at a red heat indefinitely. The electric radiators are worth their cost many times over as a convenience and a safeguard to health. The expense of running them is very reasonable, amounting to only a few cents an hour. The luminous radiator is an ornament to any room and in many instances is fitted permanently in the fireplaces of mantels. In the pastor's study, the doctor's office, in the various rooms about the home, in the sick room they are a necessity on cold summer days or during severe weather when the furnace refuses to work well.

STEAM and MILL SUPPLIES

The Pittsburg Steel Cooperage Company, of Pittsburg, Pa., will erect a plant in its vicinity for the manufacture of its products. Ballinger Bros., local engineers, are interested in the new enterprise.

The Enterprise Stamping Company's plant at McKeesport, Pa., which was destroyed by fire last winter, will be rebuilt this spring, plans for the construction of which, costing $40,000, having been prepared.

The D. T. Williams Valve Company, of Cincinnati, Ohio, expects to occupy its new building March 1. The phenomenal career of this new company is a great testimonial

D. T. WILLIAMS,
President of the D. T. Williams Valve Company, of Cincinnati, Ohio.

to the possibilities of American commercial life. David T. Williams, who was for fifteen years connected with the Lunkenheimer company as vice-president and general manager, resigned in October, 1904, and in November of that year organized the D. T. Williams Valve Company. Mr. Williams *incidentally* pays a great tribute to the

trade press when he says that because of the fact that their products were given wide publicity through the trade journals that the result was an unusually large amount of business, so that within sixty days the capacity of the plant was overtaxed. Because of the phenomenal growth in the business, on June 15, 1906, the stockholders increased the capital to $200,000, and in October, 1906, a large seven-story building at 521-523 Hunt street, newly erected, was purchased and plans were made to convert it into a modern steam specialty factory. The site is an unusually attractive one, being located in the heart of the city, with a frontage of 50 feet and a depth of 267 feet, abutting on the Pennsylvania railroad. Some of the features of the new plant are its modern power equipment, high grade brass foundry, machine finishing tools and appliances. Each large machine will have direct motor drives and the smaller machines will be driven in groups by a large motor. The new plant has 94,000 square feet, which increases their manufacturing space five times.

New plant of the D. T. Williams Valve Company at Cincinnati, Ohio.

The Wolf Machine Company, of Dayton, Ohio, has been incorporated with a capital of $20,000 to manufacture ventilators. The incorporators are Alvin F. Wolf, James W. Wolf, James A. Mumma, George A. Miller and Caroline Miller. The new company will erect a factory in Dayton View.

Any advertiser in "Domestic Engineering" is at liberty to examine its paid subscription list at any time.

PERSONAL

F. B. Taylor, of the plumbing firm of Taylor & McGuire, Aurora, Ill., was in Chicago on Washington's birthday.

J. T. Sheridan, president of the Pease Foundry Company, of Toronto, Ont., is on a six weeks' holiday tour to Naples, Italy.

J. M. H. Robertson and J. A. Robertson, of the James Robertson Company, Montreal, have returned from a trip to the firm's headquarters at Baltimore.

Leo Bloch, representing the Central Brass Manufacturing Company, of Cleveland, in the Pittsburg district, has now established permanent quarters in that city, which he will use as a vantage point in his work.

S. W. Goldman, who for years represented leading brass manufacturers in the south and west among the wholesale and plumbing trade, is now installed as vice-president of the Royal Brass Manufacturing Company, of Cleveland, Ohio.

E. A. Rogers, who on February 16 resigned as city traveler in Toronto for the James Robertson Company, a position he had held for eight years, was tendered a dinner by the manager, cashier and travelers of the firm and presented with a beautiful gold locket and watch fob, suitably engraved.

Robt. K. Story has resigned as general manager of the Central Radiator Company, of New York City, and Lansdale, Pa. Mr. Story has seen five years of active service in equipping the plant of the above company. His resignation took effect March 1, and he intends to take a much needed rest before engaging in business again.

Henry B. Gombers, secretary of the National Association of Master Steam and Hot Water Fitters, has started on a western trip and will be absent about three weeks. He left New York on Thursday, February 28, and intends to cover the north and southwest, stopping at Indianapolis on his return to meet President P. Gorml y, who finds it impossible to make the entire trip.

Howard T. Gates, secretary and general sales manager of the McCrum-Howell Company, of New York, was a business visitor in Pittsburg last week. He had made a tour of inspection of the company's plants at Uniontown, near there, and reports satisfactory conditions in all departments. He views prospects for an excellent spring and summer business as most bright.

H. J. Long, for the past three years secretary and treasurer of the Monarch Water Heater Company, has severed his connection with that concern to become secretary and treasurer of the Empire Foundry Company at New Brunswick, N. J. Mr. Long, in addition to his other duties, will assume the management of the plant. He will be succeeded in his former position by G. K. McGunegle.

E. E. Haff, of New York City, has recently returned from Florida, where he and a party of friends spent several weeks cruising on the Dorothy H. They left New York early in January for Titusville, and from there started on a cruise to Miami. After being out a few days they met the Rosemary, captained by **Thomas G. Knight**, of Brooklyn. She also had on board **C. B. Walton, Harry Weiskittel, Frank P. McCall** and **W. C. Gleason.** After holding a council of war, however, it was decided that both ships make the trip together. Hunting and fishing were not infrequent. Several wild animals were captured, among which were some half dozen "Teddy Bears." Mr. Knight is credited with the "prize catch" of the trip. While out in his canoe he was attacked by a sixteen-foot alligator, but, using his paddle as a weapon, he succeeded in subduing the monster. This was not all for Mr. Knight, however. When Half Moon Point was reached, just below Fort Pierce, on the Indian River, he fell overboard, but was safely hauled aboard by James Meekes, with the aid of a casting net. A stop was made at Palm Beach to give the members an opportunity to view the motor boat races. The members of the party arrived home greatly benefited by their sojourn.

THE LABOR FIELD

Omaha, Neb.—The Master Plumbers' Association of this city on Monday morning, February 25, notified the journeyman plumbers that owing to the fact that they had refused to "sign an agreement not to enter into a sympathetic strike during the year 1907, their services were no longer needed." It is reported that about 120 men are affected by the lockout. The Business Men's Association, an organization composed of about one thousand business men of Omaha, are backing the Master Plumbers.

Terre Haute, Ind.—The plumbers' union has presented a demand for an increase in wages from 40 to 50 cents an hour, beginning April 1. The same demand was made a year ago, when it was refused.

METAL MARKET

New York Metal Market, February 26.

Copper, Lake	$25.62½
Antimony, Cookson's	25.25
Lead	6.20
Spelter	7.25
Straits Tin	42.25

Chicago Iron Market, February 28.

For April, 1907, Delivery.

Southern, No. 2 Foundry	$26.85@27.35
Lake Superior Charcoal	27.00@27.50
Lake Superior Coke Iron, No. 2 Foundry	25.50@26.00

February 28—

Foundry iron was the same price as the week previous.
the same price as the month previous.
$5.25 per ton more than the year previous.
Copper was the same price as the month previous.
5½c per pound more than the year previous.

Pig iron is the center of attraction. Keen interest is displayed in every move and rumor regarding the situation. The air is full of bearish talk and authenticated reports are current that southern prices are being shaded for other deliveries besides the last half, says the "Iron Trade Review." Considering the number of rumors afloat which would tend to increase any inherent weakness, remarkable strength is shown. One event which has been widely referred to as an indication of weakness was the action of a large independent steelmaker in refusing, on account of what is considered the excessive price, to take about 50,000 tons of Bessemer and basic pig iron on a sliding-scale contract which permitted such action in case the price reached a certain point. The ease with which this tonnage, suddenly thrown upon the market, was absorbed, is, however, proof of the strength of present conditions.

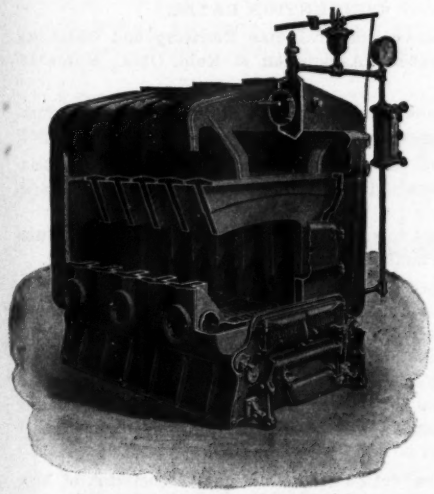
Copper is becoming more difficult to buy each day and bids are being constantly made for casting, electrolytic and lake copper at prices which range from 25 cents per pound upwards, and deliveries are in but few cases promised earlier than September. The extreme cold weather that has prevailed throughout the country during the last few weeks has made the production much below normal and the scarcity will be felt for some weeks to come. The present prices of copper metal are 5½ cents a pound over the 1906 market, with a greatly increased demand.

Bonham, Texas.—N. N. Nunn, a plumber, has filed a petition in bankruptcy. His liabilities are scheduled at $1,235.43 and his assets at $1,230.

New York, N. Y.—Discharge in bankruptcy has been granted to Richard W. Hillman, who did business as the Empire Heating Company at 123 East Twenty-third street. His liabilities were scheduled at $44,490.

The Inner Boiler.

It is an ideal union of grate and heating surfaces with sharp fire and flame contact, liberal chamber spaces for burning gases, correct water areas and circulation,—inner Boiler features,—which give IDEAL Boilers their excelling capacity.



New Ideal 36 Inch Steam Boiler.

The outer features of style, running conveniences, height and connection are also carefully executed, but it is the inner Boiler which gets the bulk of concentrated, expert attention.

AMERICAN RADIATORS & IDEAL BOILERS

AMERICAN RADIATOR COMPANY

General Offices: 282-284 Michigan Avenue, Chicago.

New York, 104-108 West 42d Street.
Boston, 129-131 Federal Street.
Philadelphia, 1342 Arch Street.
Baltimore, 109 E. Lombard Street.
Buffalo, Court and Franklin Streets.
Pittsburg, 601-603 Hartje Building.
Cincinnati, 213 W. Fourth Street.
Cleveland, 710 Prospect Avenue.
Chicago, 282-284 Michigan Avenue.
Milwaukee, 126 Sycamore Street.
Indianapolis, 511 Lemcke Building.
Detroit, 225 Jefferson Avenue.
St. Louis, Olive and Fifteenth Streets.
Atlanta, 11 North Forsyth Street.
Omaha, 413-417 South Tenth Street.
Minneapolis, 229 Fifth Street, South.
Kansas City, 313 East Tenth Street.
Denver, 831 Fifteenth Street.
Seattle, 1215-1216 Alaska Building.
San Francisco, Monadnock Building.
London, E. C., 89-90 Shoe Lane.

ASSOCIATION NEWS

Chicago, Ill.—The Chicago Master Plumbers' Association will hold its meeting on Friday, March 8, at which time several new applications for membership will be acted upon. Topics of trade interest will also be discussed.

New York, N. Y.—The National Association of Master Steam and Hot Water Fitters extends an invitation to all master fitters throughout the United States to attend its nineteenth annual convention, which will be held at Washington, D. C., on May 20-23, and to be present at all open sessions, whether they are members of the association or not.

Detroit, Mich.—The Master Plumbers' Association of this city has recently elected delegates to the coming convention of the Michigan State Association of Master Plumbers as follows: O. A. Wurm, C. P. Tietze, S. H. Morgan, N. Boosey, Emil Roos, W. G. Stone, Wm. Gourlay, Jr., Samuel Graham, Jr., T. F. Norris, P. C. Steiner, Benj. Guiney, J. E. Lee, Geo. H. Crumley, J. W. Partlan, Ben Oakes, E. P. Steiner, J. J. McGinnis, Jacob Zerga, J. T. Gray, E. M. Harrigan, Robert Ernst, C. H. Deane, F. J. Bowes, J. W. Drury, Ernest Venn, W. G. Irvine, A. Hassig, Jas. H. Crumley, J. A. Nagle, Ernst Wenzel, Geo. De Ville, J. H. Ennis, Jas. Cameron, O. M. Titus, Wm. Hughes and Chas. Braun.

New York, N. Y.—The master plumbers composing the Manhattan branch of the New York City Association held their first informal "**Ladies' Night Social**" of the 1907 season on Tuesday evening, February 26. It was marked by an unusually large attendance and proved to be a tremendous success. An excellent vaudeville entertainment offered rare enjoyment until 10 o'clock, when the members and their guests sat down to an elaborate supper. Dancing then engaged their attention, which was kept up till a late hour. The association had among its guests of the evening Mr. and Mrs. Edward MacDonald, of Brooklyn, and Mr. and Mrs. Dan Durie, Jr., of the Bronx. State Treasurer L. F. Bannon, of Kingston, while en route to Connecticut, stopped in the city to attend the event. O. E. Moske, of Cleveland, Ohio, was also in attendance. The committee responsible for the success of the evening was composed of the following gentlemen. Thos. S. Cochrane, Jr., chairman; I. J. Brown, secretary; F. B. Lasette, treasurer; E. J. Brady, T. A. Hill, B. F. Donohoe, Frank Reynolds, John Renehan, T. J. Byrne, J. D. McEntee, F. J. Fee and J. P. Knight.

Union Hill, N. J.—The North Hudson Association of Master Plumbers held its annual banquet and prize bowling contest on Thursday afternoon and evening, February 21, at William C. Franz's cafe. The bowling commenced early and consumed the whole afternoon. There were many ardent devotees of this sport present and some lively games were rolled. Among the many useful prizes contested for were those offered by the various material houses and which were both elaborate and varied in their make-up. The following firms donated these useful remembrances: The Graff Furnace Company, L. O. Koven & Bro., the Boynton Furnace Company, Thomas G. Knight, E. W. Berger & Bro., the Alberene Stone Company, the John Douglas Company, the Peerless Granite Company, the Good Manufacturing Company, the Glauber Brass Manufacturing Company and the United Brass Manufacturing Company. After the games were over the members and their guests adjourned to the banquet hall, where an elaborate menu awaited them. "The Star-Spangled Banner" was then sung, and during the banquet vocal and instrumental selections were rendered. "Joe" Sybel displayed his true patriotism by constructing two battleships on his plate which would be a valuable addition to the Atlantic Squadron. At this juncture Louis A. Menagaux, who acted as toastmaster, proposed a toast to "George Washington," saying it was then midnight on the eve of the birthday of the greatest of good men and the best of the great men. He then in turn called upon National State Vice-President George S. Aldons, of Passaic; State Secretary H. F. Baillet, of Newark, and August Krieger, of the local association, each of whom spoke interestingly on various topics. Miniature water closet bowls were then distributed as a souvenir of the occasion. The supply men were there in force and were willing to serve in any capacity to make the evening enjoyable. Herman Figuë, of the United Brass Manufacturing Company, favored the members with his latest hit, "The Charge of the Dutch Brigade." Thus the day was spent, and after singing "America" the members dispersed, with an earnest wish that they all meet again at this time next year.

CONVENTION DATES.

Annual convention of **Indian Territory and Oklahoma Master Plumbers' Association**, at Enid, Okla., March 12, 1907.

Annual convention of **Indiana State Association of Master Plumbers**, at Indianapolis, Ind., March 20 and 21, 1907.

The annual convention of the **Michigan State Association of Master Plumbers** will be held at Detroit, March 20-21, 1907.

Annual convention of **Pennsylvania State Association of Master Plumbers**, at Harrisburg, Pa., April 16, 1907.

Annual meeting of the **National Supply and Machinery Dealers**, the **American Supply and Machinery Manufacturers' Association** and the **Southern Supply and Machinery Dealers' Convention**, Cincinnati, Ohio, May 8, 9 and 10, 1907. Headquarters at the new Hotel Sinton.

The annual meeting of **the Massachusetts Association of Master Plumbers** will be held in Elks' Hall, Boston, on May 9, 1907.

Annual convention of the **National Association of Master Steam and Hot Water Fitters**, at the Arlington Hotel, Washington, D. C., May 21-23.

Annual convention of the **Kentucky State Association of Master Plumbers**, Louisville, Ky., June 24, 1907.

The twenty-fifth annual convention of the **National Association of Master Plumbers** at Louisville, Ky., June 25-27, 1907.

The Cleveland Gas & Electric Fixture Company has moved its offices from Cleveland to its factory at Conneaut, Ohio.

The Paul Automatic Gas Company, of Montreal, has been incorporated with a capitalization of $145,000 to manufacture a machine which will generate gas from gasoline.

PLUMBING LEGISLATION

Kalamazoo, Mich.—Efforts are being made to have the plumbing ordinance revised.

Cleveland, Ohio.—The city council at its last meeting passed an ordinance creating a board of plumbing examiners.

Peoria, Ill.—A new plumbing ordinance has been introduced to the city council and it is expected that it will be adopted at an early meeting.

Boston, Mass.—Ex-Chief Downing, of the Lynn fire department; Thomas B. Knight, Henry C. Paul and Inspector Breed, all of Lynn, together with Secretary Goddard, of the New England Insurance Exchange, are advocating a bill before the legislature requiring the maintenance of valves or shut-offs on gas supplies outside of buildings for use in case of fire.

OBITUARY

J. H. Ellenbaum, a master plumber of Niagara Falls, N. Y., has the sympathy of his many friends in the trade in the demise of his only son, Clark E. Ellenbaum, which occurred Saturday morning, February 9. Young Mr. Ellenbaum was only 25 years old, and his early demise is a great loss to his parents and his many friends at Niagara Falls, where he spent his entire life.

Wm. H. Wallworth, a master plumber of Buffalo, N. Y., passed on at the General Hospital in that city on Monday morning, February 25. Mr. Wallworth was born in Manchester, England, in 1871, came to this country in 1889 and settled in Rochester, N. Y., where he learned the plumbing trade. Twelve years ago he moved to Buffalo and engaged in business on his own account at West Ferry and Chenango streets, where he conducted a successful plumbing establishment up to the time of his demise. He is survived by his wife and three children.

BUSINESS VENTURES

Austin, Minn.—Pfremmer & Carl have engaged in the plumbing business here.

Shenandoah, Pa.—George Hess has opened a plumbing establishment at 133 North West street.

Sleepy Eye, Minn.—Cuddy & Cavanaugh, of New Ulm, Minn., will establish a branch plumbing business here.

Mingo, Ohio.—S. E. Adkins will open a plumbing establishment on Commercial street, which will be attractively equipped.

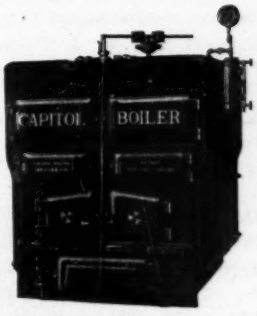
New Orleans, La.—J. E. Manion & Co. have incorporated with a capital stock of $10,000 and will engage in the plumbing business.

Steubenville, Ohio.—The plumbing establishment of John A. Hamilton has been moved to larger quarters at 240 North Fourth street.

CAPITOL BOILERS AND RADIATORS

More Heat—The Capitol

One of the strongest points about the Capitol Boiler is its ability to extract every heat unit out of the fuel consumed. This results in great warmth at the smallest possible consumption of fuel. The advantage of this need not be emphasized to you. You will at once recognize that this feature will more strongly appeal to your prospective customer than any other. Show a man where he can save money and he is at once interested. Tell this point to your prospect and see how quickly you will land his order. The great Capitol heat and fuel economy gives you a substantial advantage over your competitors. We will be very glad indeed to send you our catalog.



Heavy Duty Capitol Boiler (Steam)

United States Heater Company.

Home Offices and Works: DETROIT, MICH.

BRANCHES:
NEW YORK, 129 Worth Street
CHICAGO, 42 Dearborn Street
KANSAS CITY, MO., 114 W. 11th Street
OMAHA, NEB., 419 S. 15th Street

SALES AGENCIES:
BOSTON, MASS., J. H. Cunningham & Co.
DENVER, COLO., Kellogg & Stokes Stove Co.
MINNEAPOLIS, MINN., Plumbing & S. F. Supplies Co.

BUSINESS CHANGES

Wichita, Kan.—Odell & Green have been succeeded in the plumbing business by N. M. Odell.

Sheridan, Wyo.—E. H. Salisbury has succeeded to the plumbing business of Farnham & Salisbury.

Las Cruses, N. M.—S. A. Bippus & Co. have succeeded to the plumbing business of Bippus & VanDusen.

Brookfield, Mo.—The Brookfield Plumbing and Heating Company has succeeded to the business of Hackett & Hinkels.

St. Cloud, Minn.—E. A. Kneip has sold his plumbing business and stock to the firm of Doyle, Davis & Gardner. Mr. Kneip intends to locate at Los Angeles, Cal., where he will engage in the same line of business.

Tampa, Fla.—Tampa Plumbing and Supply Company announces that it has disposed of its plumbing business and changed its name to that of Florida Gas Engine and Supply Company, and that it will in the future devote all its attention to the sale of gas engines and allied lines.

Pittsburg, Pa.—The old and well known Meagher Heating Company, 815 Forbes street, has passed out of existence, having been sold to J. J. Burns, an engineer connected with the concern, and H. E. Fleming, formerly connected with the American Radiator Company and traveling the Pittsburg territory. The new firm will be known as the Burns & Fleming Company, and will conduct the business at the old location.

CONTRACTS AWARDED

New Orleans, La.—A. Aschaffenberg, of this city, has been awarded the contract for the plumbing and heating plants for the new Maison Blache.

Philadelphia, Pa.—P. Gormly, of 155 North Tenth street, has received the contract for extensive alterations in the plumbing and steamfitting at 608 Chestnut street.

McKeesport, Pa.—W. J. Childs, a master plumber of this city, is erecting three residences on Evans avenue in which he will install the plumbing and heating work.

York, Pa.—The heating and ventilating contracts for the new York jail have been awarded to the York Engineering Company, of this city. The contract price was $6,800.

Philadelphia, Pa.—Robert M. England, of Fifty-fifth and Market streets, is busy with the installation of plumbing systems in 160 houses at Fifty-fifth and Chester avenue.

Pittsburg, Pa.—The contracts for the steam heating and power plants for the new hospital in the Shady Side district have been awarded to Westinghouse, Church, Kerr & Co., of this city.

Avalon, Pa.—George H. Lewis & Co. have awarded the plumbing contract for three $8,000 residences that they are building on Orchard avenue to John Winters & Co., of Centre street.

Philadelphia, Pa.—Samuel Faith & Co., of Twenty-fifth street and Pennsylvania avenue, is fitting up all the stations on the Market street elevated railway with porcelain plumbing fixtures.

BOWLING NEWS

Pittsburg, Pa.—The final games of the season of 1906-7 in the Pittsburg Jobbers' Bowling League were rolled on Monday night, February 25, when the Pittsburg Supply Company, by a last effort, won all of their games and forced the Bailey-Farrell Manufacturing Company, which team was successful in winning but two of its games, out of first place, thereby winning the championship. The fight has been a hard and a close one for the past three months, and, as will be seen from the results, the final decision was not reached until the last games had been rolled. The finish was one of the closest and most sensational that has ever been witnessed in a local amateur league of bowling clubs. At the beginning of the series the Bailey-Farrell Manufacturing Company led by the small margin of one game, and at the close of the meeting had lost the championship by the close margin of two games.

This result was entirely unexpected, although the Bailey-Farrell team has not been playing the accustomed snappy game, with the general high scores, that have characterized its games for the greater part of the season. They dropped the first game to the Monarch Water Heater Company, which previous contests had been an easy victim, while the Pittsburg Supply Company, which was pitted against the team of the Kelly & Jones Company, had one of the strongest teams in the league as a competitor, and yet was able to make a clean sweep of the series, winning the championship.

The games resulted as follows:

Ruud Manufacturing Company...	781	862	743
Iron City Sanitary Mfg. Company.	702	727	760
Pittsburg Supply Company.....	775	784	743
Kelly & Jones Company.....	714	771	710
Duquesne Sanitary Company.....	796	779	637
Harris Pump & Supply Company.	667	708	759
Standard Manufacturing Co.....	746	829	729
Standard Sanitary Mfg. Company.	862	762	897
Monarch Water Heater Company.	840	777	776
Bailey-Farrell Mfg. Company....	776	787	768

New York, N. Y.—On Tuesday evening, at the Star Casino alleys, the first games this week in the tournament of the New York Plumbing and Steam Supply League were played. The Metal Worker won all three games played with the F. N. DuBois & Co. The Plumbers' Trade Journal rolled a warmly contested series with Abendroth Bros., in which two scores of over 200 were rolled. Smith, of F. N. DuBois & Co., obtained 204 in the first game, and O'Flynn, of the Plumbers' Trade Journal, 203 in the third. The results of the evening's contest were as follows:

	1st Game.	2d Game.	3d Game.
The Metal Worker.....	831	773	750
F. N. DuBois & Co.....	798	690	667
Plumbers' Trade Journal.....	716	693	738
Abendroth Bros.	745	676	717

PATENTS

842,286. **Sewage Elevating and Discharging Apparatus.** Eric A. Wilson and Charles Rigdon, Duluth, Minn., assignors of one-fourth to Daniel D. Murray and one-fourth to Thomas F. McGilvray, Duluth, Minn.

842,311. **Boiler-Tube Cleaner.** Christian Gottwald, Cleveland, Ohio.

842,314. **Pyrometer.** George Heeley and Charles Féry, Paris, France; said Heeley assignor to La Compagnie pour la Fabrication des Compteurs et Materiel d' Usines à Gaz, Paris, France.

842,370. **Oil-Burner.** Nicholas Zucke, Sparks, Cal.

842,375. **Drain-Valve.** Lewis J. Ashworth, Huntington, W. Va.

842,527. **Construction of Lavatories and Like Fixtures for Domestic Use.** Alexander H. Cline, Jr., Kansas City, Mo., and James H. Danver, Beaver, Pa.

842,558. **Lavatory.** John F. Kelly and Harry S. Maddock, Trenton, N. J., assignors to Thomas Maddock's Sons Company, Trenton, N. J., a corporation of New Jersey.

842,606. **Air-Vent Valve.** Everett P. Allen, Chicago, Ill., assignor to Romeo M. Wilbur, trustee, Chicago, Ill.

840,860. **Faucet.** Otto Mueller, New York, N. Y.

842,637. **Automatic Valve.** Clayton A. Dunham, Marshalltown, Iowa.

842,696. **Water Supply and Purification System.** George Pfeiffer, Jr., Brown Mills, N. J.

842,887. **Gas-Burner Regulator.** William C. Homan, Meriden, Conn., assignor to Edward Miller & Company, Meriden, Conn., a corporation of Connecticut.

842,905. **Combined Blowpipe and Soldering Attachment.** Philip P. Nungesser, Cleveland, Ohio, assignor to the Nungesser Electric Battery Company, Cleveland, Ohio, a corporation of Ohio.

843,069. **Sewer-Trap.** Gordon G. Burdick, Chicago, Ill., assignor of one-half to Charles Ford, Chicago, Ill.

843,019. **Steam-Trap.** Robert C. Johnston, Newport, Ky.

842,914. **Hot-Air Deflector and Dust-Collector for Radiators.** Christian E. Schafer, Cleveland, Ohio.

THE
ELJER
FLUSHING
VALVE

Unreservedly
Guaranteed

It cannot fail to work uniformly. It contains no piston or other close working parts that cause friction. Excessive friction caused by sand grit and corrosion has caused all the past trouble with flushing valves. Write us for further information.

ELJER CO.

67 HAMILTON ST., NEWARK, N. J.

843,093. **Heat-Regulating Apparatus.** Nathan E. Nash, Toronto, Ontario, Canada.

842,962. **Acetylene-Gas Generator.** George Laporte, St. Felix de Valois, Quebec, Canada, assignor of one-half to J. H. Chevalier, Campbell, Neb.

842,922. **Ball-Cock Valve.** Charles C. Tozier, Skowhegan, Me., assignor to Maine Valve Company, Skowhegan, Me., a corporation of Maine.

843,165. **Pipe-Joint.** John C. McElroy, Providence, R. I.

843,260. **Bathing Apparatus.** William H. Cloud, Philadelphia, Pa.

843,180. **Air-Washer.** Charles W. Rogers, Chicago, Ill., assignor to Mathis Brothers Company, a corporation of Indiana.

843,282. **System of Piping for Circulating Systems.** John C. Kitton, Detroit, Mich.

843,366. **Lubricator.** Edward Reber and Everett C. Clark, San Bernardino, Cal.

843,379. **Incandescent Gas-Burner.** Frank T. Williams, Meriden, Conn., assignor to Edward Miller & Company, Meriden, Conn., a corporation of Connecticut.

843,402. **Steam-Trap.** John Langridge, Ramsgate, England.

843,525. **Automatic Steam and Hot-Water Safety-Cock.** John A. Frey, Washington, D. C.

843,526. **Water-Heater.** John A. Frey, Washington, D. C.

843,536. **Lubricator.** George W. Ingham, Sault Ste. Marie, Mich.

Domestic Engineering

Published Weekly by Domestic Engineering (Incorporated), $1.00 a Year. 5 cents a Copy. Office: 58-64 North Jefferson Street, Chicago. Tel. Monroe 816.

Advertising—Copy and cuts for advertisements should be received by the last day of the week preceding publication. We cannot guarantee insertions or changes in advertisements if received later.

Entered in the Postoffice in Chicago Illinois, as mail matter of the second class. Dec. 12. 1901.

March 2, 1907

Classified Advertisements

The rate of advertising under this heading is 10 cents a line an insertion. The average advertisement runs six words to a line. To insure insertion in this column copy should be received not later than Wednesday afternoon.—One man from Opelika, Ala., writes under date of January 18, 1907: "The little ad I had in Domestic Engineering on the 12th inst. has brought me 27 inquiries up till today. I consider it the best magazine that ever went into any office."

Help Wanted.

WANTED—SALESMEN TO HANDLE plumbing specialty as side line. Address The Snow Mfg. Co., Denver, Colo. 3-9

WANTED—JOURNEYMAN PLUMBERS to work in open shop. Wages, $4.00 a day, 8 hours. Steady work. Address Simmons & Young, Mobile, Ala. 4-13

WANTED—SALESMAN TO CARRY A first class ball cock as a side line; a ready seller and gives satisfaction; state what territory you cover. No. 619, "Domestic Engineering," Chicago. tf

RADIATOR AND BOILER MANUfacturer wants at once a salesman for Chicago. One familiar with installation work preferred. Good position for right man. No. 644, "Domestic Engineering," Chicago. 3-2

WANTED — THOROUGHLY COMPEtent estimator and draftsman to figure and lay out work in plumbing, heating and ventilating. Must be thoroughly experienced and furnish best references. No. 636, "Domestic Engineering," Chicago. tf

EASY MONEY FOR SALESMEN CALLing on plumbers in all lines, selling a rattling good specialty. One which will not conflict with line you may now be selling. Sample weighs less than 2 ounces and can be carried in vest pocket. A handsome proposition and easy to sell. No. 647, "Domestic Engineering," Chicago. tf

An Opportunity
WE WANT A MAN

of good address and thoroughly posted in the theory of Sanitary Plumbing. Must be good draftsman and capable of designing intricate plumbing systems. State fully qualifications and experience. No. 643, "Domestic Engineering", Chicago. 3-2.

WANTED—A COMPETENT MAN TO take charge of specialty department in the supply business. Must be thoroughly posted in steam and hot water heating and capable of making plans for heating system. Give reference and salary expected. Address Box 701, New Orleans, La. 3-2

WANTED—A MAN IN EVERY CITY to sell our Water Lift, Lewis Power Washer, Self-Closing Faucet, and Stop and Waste on commission. Write the Monarch Mfg. Co., 118 Vine St., Columbus, O. 3-2

A THOROUGHLY EXPERIENCED man in steam and hot water heating boilers can secure a satisfactory investment and a high-class position with $3,000 to $5,000 cash; accompanied with ability to manage office and sales department. Give experience and full particulars in first letter. No. 648, "Domestic Engineering," Chicago. 3-2

Situations Wanted.

SALESMAN REPRESENTING LEADing plumbing and steam goods supply house in Middle Western States wants to change territory. A1 references; a hustler; not a cheap man. In answering please state particulars. No. 637, "Domestic Engineering," Chicago. 3-9

WANTED—SITUATION AS PLUMBer's helper. Have had some experience in both lead and iron pipe work and am willing to work for reasonable wages where there is chance for advancement. No. 641, "Domestic Engineering," Chicago. 3-16

A MAN WITH LONG AND CLOSE acquaintance with the jobbers of Chicago and Chicago territory is prepared to represent manufacturers of plumbing and heating goods desiring an outlet for their goods in Chicago and vicinity. No. 639, "Domestic Engineering," Chicago. 3-9

SITUATION WANTED — EXPERIenced salesman, 32 years of age, at present employed as manager of plumbing Dept. in Chicago wholesale house; will accept similar position in purchasing Dept. or good traveling position. Also well acquainted in heating line, mill and engineers' supplies. Only first class connection considered. No. 646, "Domestic Engineering," Chicago. 3-2

JUNIOR PARTNER WANTS JOB IN small country town. Has no card but willing to get one. No. 645, "Domestic Engineering," Chicago. 3-2

For Sale.

FOR SALE—NEW GALVANIZED VERtical range boiler with steam coil; 144 gal.; 6 ft. by 24 in. J. C. Bixby & Son, Council Bluffs, Ia. tf

FOR SALE—THREE COILS OF 1¼" new, strong lead pipe; price, 6½c a lb. No. 642, "Domestic Engineering," Chicago. 3-2

FOR SALE—A WELL ESTABLISHED plumbing and heating business. Fine opportunity for right party. Address Taylor & McGuire, Aurora, Ill. 3-9

FOR SALE—A LONG ESTABLISHED branch in the plumbing, steam, roofing and tinsmithing business in the best part of the Bedford Section of Brooklyn; only $300 required. J. B., 1226 Sterling Pl., Brooklyn. tf

FOR SALE—ONE 6½ MERRELL PIPE cutting and threading machine for hand or power; cuts and threads from 1" to 6"; with right-hand dies from 1" to 6" and left-hand dies from 1" to 2"; with countershaft. Price, $200 f. o. b. Philadelphia. F. H. O'Neill, 154 N. 7th St., Philadelphia. 3-2

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WHAT VACUUM SYSTEM DO YOU wish to become familiar with? Write Thomas Tait, Box 229, Omaha, Neb. Consulting Expert Plumbing and Heating Engineer. 3-16

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A wrench that slips or crushes the pipe is useless—the striking advantage of using the BULLARD AUTOMATIC WRENCH is its extraordinary strength and its application, which prevents crushing the pipe. The BULLARD can be used in any position—with one hand. The time spent fussing with nut and screw wrenches is saved. A BULLARD AUTOMATIC in use will pay for itself in two months in time saved. Ask your dealer. Replace your old wrench with this modern one.

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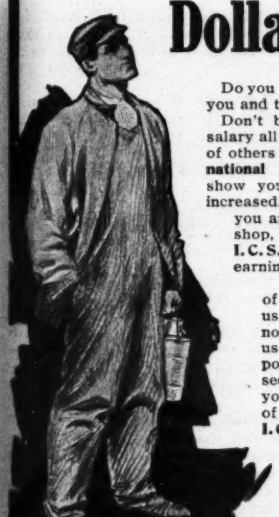

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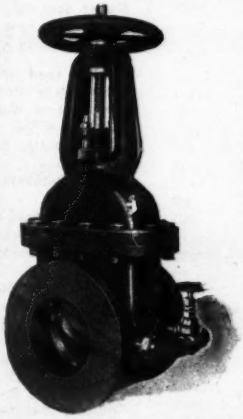

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The extremely cold weather on the Pacific coast in January caused much suffering and supplied plumbers with plenty of jobbing work. Down as far as California the cold wave made people shiver, but the worst suffering took place in Vancouver, Seattle and other Puget Sound cities. In Vancouver many sewers which were not laid deep enough froze up, and householders who let their taps run to avoid freezing had their houses flooded. For the first time in the history of the Vancouver trade the electric thawing apparatus was brought into service. The electric company offered to thaw all-iron services for a $5 charge and lead pipe connections for $8. In several cases kitchen boilers have exploded owing to fires being lit without thawing the frozen pipes. One explosion, in the Children's Home, broke a child's leg and injured two others. Plumbers have been working night and day on repair jobs, with new work at a standstill. A lesson has been taught the civic authorities and new regulations will call for better work in the future.

BREAKING THE NEWS.

He was a young doctor, and he had been asked to break some sad news to the wife of a man who had been run over by a motor.

"Is my husband really ill?" asked the lady.

"A—er—a little run down," said the budding Treves, hopefully.—Evening Standard.

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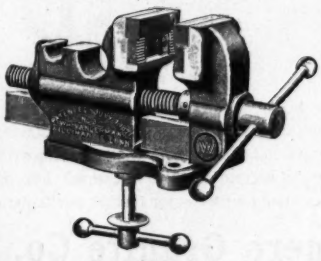

COMBINATION BENCH PIPE VISE

THREE COMBINATIONS IN ONE CONSTRUCTED W TH STEEL SLIDING BAR

A combination pipe vise, to be useful and practical, must admit of each part of the combination being independent of the other. The combinations in the "Vanderman Vise" are independent of each other and do not conflict. It is a perfect combination vise and has more advantages than any other vise in the market. It is strongly made and the parts made to duplicate, and will give satisfaction. The sliding bar, screws, handles and jaws are made of steel, and all the parts have been put to and have stood the severest test. Holds pipe from ⅛ inch to 10 inches, with bending form for bending pipe up to 2 inches.

WRITE FOR CATALOGUE OF VANDERMAN SPECIALTIES

The Vanderman Plumbing & Heating Co., WILLIMANTIC, CONN.

There is a Reason

Why our business is growing rapidly

Orders received in the morning are shipped the same day. We are specialists in promptness, also in

Water Closet Combinations

We carry everything in the line of plumbing and house heating supplies in ready stock for immediate shipment. Our unconditional guarantee is back of every transaction. Write us today for PRICE PARTICULARS.

WESTERN PLUMBING SUPPLY COMPANY

20-22 DESPLAINES STREET, CHICAGO, ILL.

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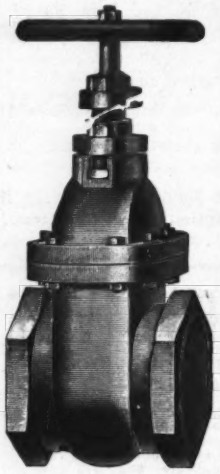

Discs interchangeable. Can be packed either opened or closed. Full weight, first-class material, superior finish.

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Send for Circular.

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Manufacturers of Steam, Gas and Plumbing Goods
DETROIT, MICH.

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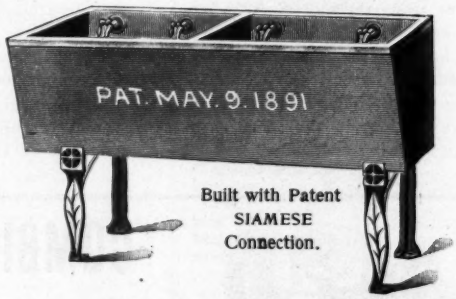
Granitine Laundry Tray

IS BY FAR THE BEST LAUNDRY TRAY EVER PLACED UPON THE MARKET



Built with Patent SIAMESE Connection.

The above statement is made without fear of contradiction. We maintain the highest standard of sanitary construction by our process of manufacture and offer a ten years' guarantee with our goods. We ship trays securely crated in carload lots or small orders. Plumbers should write us for further particulars

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M. I. W. Boiler Stands

Showing Adjustment.

Architects Plumbers and Builders Like Them

If space in your stock room is an object this stand should have your consideration

Ready for Shipment.

Modern Iron Works
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Write for Prices.

We Ship Promptly

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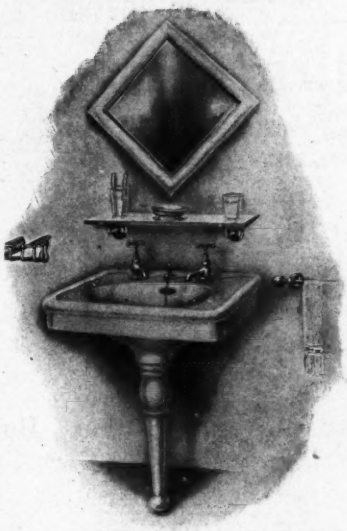


EVERY DESIRABLE PATTERN

They can be furnished with our *Patent Overflow or Soap Drip* which permits of the hand going down with a cloth to wipe it out. This special sanitary feature alone commends our line of *Vitreous China Lavatories* to your highest esteem. Our present prices on small vitreous lavatories are especially attractive. May we send you our new and complete catalogue?

FORT PITT Supply Co PITTSBURG PENN.

We also carry an immense stock of Plumbers' Supplies ready to ship at a minute's notice.

FORT PITT Supply Co PITTSBURG PENN.

HOT AIR AND ELECTRICAL PUMPING ENGINES

ARE AS FAR AHEAD OF THE WIND PUMP AND OVERHEAD TANK AS THAT SYSTEM IS AHEAD OF "THE OLD OAKEN BUCKET"

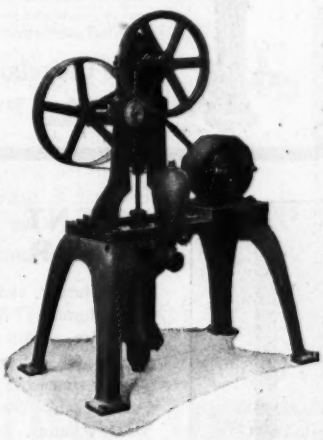
Runs by Heat

NO EXPLOSION NO EXHAUST
NO NOISE NO VALVES
A CHILD CAN RUN IT
NO TROUBLE

PLUMBERS IN SMALL CITIES

who will talk up this engine to the neighboring farmers will in many cases secure contracts for the installation of complete plumbing systems.

Write Today for Special Proposition and Exclusive Agency



Runs by Electric Motor

THOMAS & SMITH

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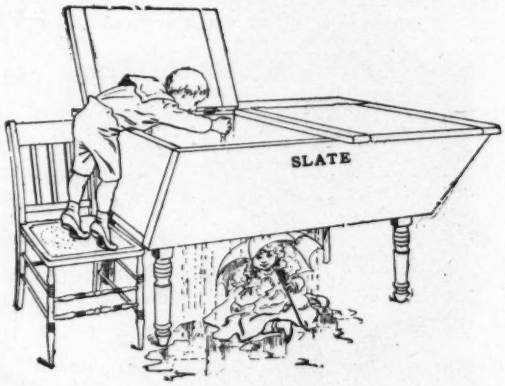
People are getting wise

They now know that laundry trays and kitchen sinks must be impervious, non-porous, easily cleaned, beautiful to the eye — sanitary as well as handsome. They know the wooden tray is a nasty makeshift. They know now they want the



Alberene Stone

and every jobber in the United States can instantly supply you. But be careful to specify "ALBERENE". Catalogue free.

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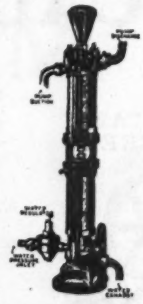

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WATER LIFT

FOR PUMPING SOFT WATER

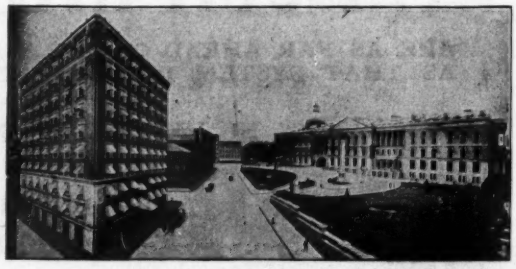
Well made. Noiseless. Requires no oil or attention. Is absolutely automatic. Guaranteed to you, to give perfect satisfaction. Write for prices and further information.

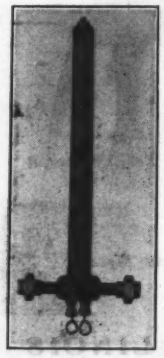
The Cleveland Faucet Co.

Cleveland New York Chicago
St. Louis San Francisco

COMMONWEALTH HOTEL

Opposite State House, in Boston, is new and absolutely fire-proof. Elegant rooms with private baths, $1.50 and $2.00 a day. Fine rooms with shower baths 1.00 a day. The cafe and dining room are first class. Storer F. Crafts, Mgr.





PATENT FURNACE WATER HEATER

This heater can be installed in any furnace without disturbing the fire. Will furnish sufficient water for ordinary domestic use. Easily connected and after once installed can be removed and replaced in 30 minutes. Equipped with brass rods to remove all deposits. Made in three sizes.

GATES & FOX

419 E. 16th Street Indianapolis, Ind.

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"PLEASE THE EYE AND HEAT THE ROOM"

A complete line

All sizes All special Plain or ornamental

Shirley Radiator & Foundry Co., Indianapolis, Ind.

RADIATORS

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THAT RELIABLE BALL COCK—MECHANISM—QUALITY OF MATERIAL—FINISH AND DURABILITY THAT WE PUT IN THE

Hamilton Gem Closets

stands between the Architect and Plumber and their Customer's disappointment, a Closet that is

Built Right—Look Right—Work Right

IS A GOOD THING

THE WALDORF.

Try our Fig. 16 Self-Raising Saddle Seat for public places, fits on all regulation bowls, makes a combination of urinal and closet both in one.

★

Are now installing in every Hamilton Gem Tank the **Reliable Ball Cock**, a recent patent, and we challenge the world to produce its equal. All pressures from 1 lb. to 250 lbs. look alike to it, no cup leathers, no close working parts, leverage 100 to 1, is the only compound supply valve made where the plunger is centered with a pin on the bar, seats square and true every time, has removable seat plate of phosphor bronze. Reliable Ball Cock can be used for repairs in any make of closet, high or low, for we make the thread, coupling and tail piece of the stem all sizes, just mention the size coupling or the name of closet you want it for. Haven't had a single adverse criticism on the **Reliable Ball Cock**, each mail brings us duplicate orders and words of contented satisfaction from Mr. Plumber.

The Hamilton Gem Low Down Closets

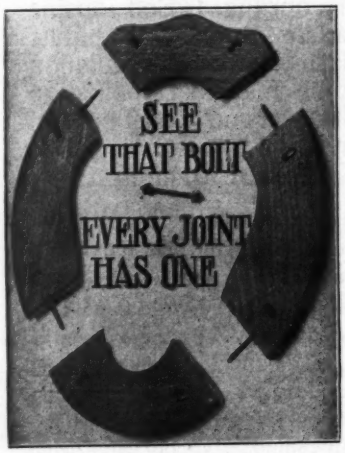
MADE ONLY AT
Hamilton, O.
BY

The Sanitary Mfg. Co.

The "Never-Split" Closet Seats

represent the superlative degree of

Closet Seat Construction



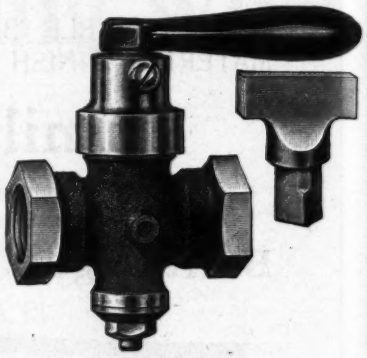
Practically speaking, these seats are indestructible. They are finished to perfection. They cost little more than the commonest kind.

If your jobber does not carry them write us direct

Never-Split Seat Co.
EVANSVILLE, IND.

THE "FOREST CITY"

IF



it is an advantage to have a Stop & Waste Cock that you can change instantly to a right or left hand and that will cost no more than the other kind, —

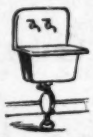
WRITE TO-DAY!!

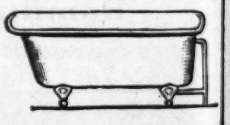
The Forest City Brass Mfg. Co.
Plumbers' & Steamfitters' Supplies
Cleveland, Ohio

Mark Your
Plumbing Plans

Tyler's Rubber Stamps of Plumbing Fixtures

Each fixture is an individual rubber stamp, exact size of cut; location of fixtures in any variety can be shown on building plans and applications for permits. Set of six stamps, with ink pad, in box, sent prepaid upon receipt of $2.00.

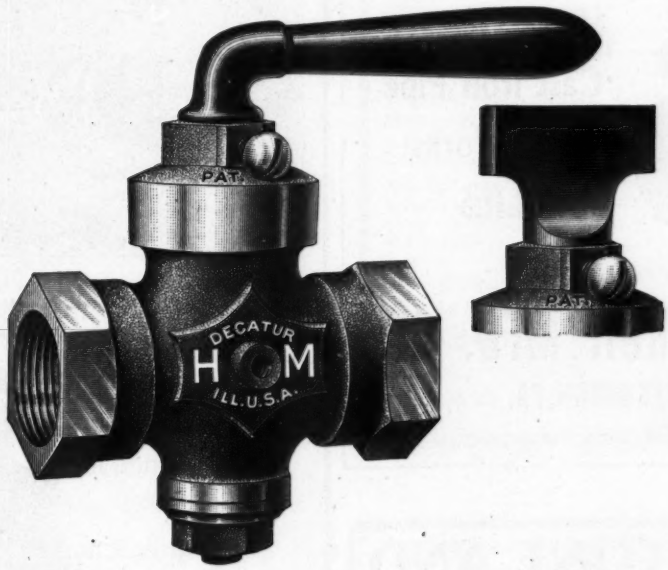




DOMESTIC ENGINEERING
49-53 N. Jefferson Street
CHICAGO

THE ADVERTISEMENTS IN DOMESTIC ENGINEERING ARE INDEXED. TURN TO PAGE XXVI.

MUELLER "NO. 49" STOP AND WASTE COCKS



Broad hexes that give the wrench a firm grip, and pipe ends reinforced next to the body so as to stand the twist. Standard and extra patterns. Test under 200 pounds hydraulic pressure.

THE MARK OF UNCONDITIONAL DECATUR H M ILL. U.S.A. GUARANTEE MUELLER GOODS

H. MUELLER MFG. CO.

Works and General Offices
DECATUR, ILL., U. S. A.
West Cerro Gordo St.

Eastern Division
NEW YORK, N. Y., U. S. A.
254 Canal St., Cor. Lafayette

LUDLOW

Gate Valves
Fire Hydrants
Sluice Gates
Cast Iron Pipe
Water Works
SUPPLIES

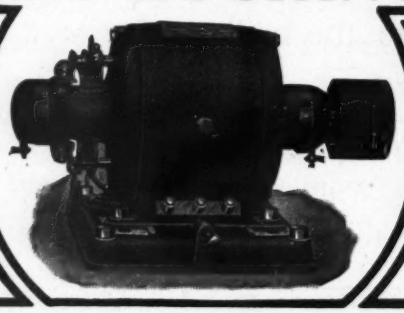
MANUFACTURED BY

PITTSBURGH MFG. CO.

PITTSBURGH, PA.

WRITE FOR OUR CATALOGUE

HALFTONE AND ZINC ETCHING

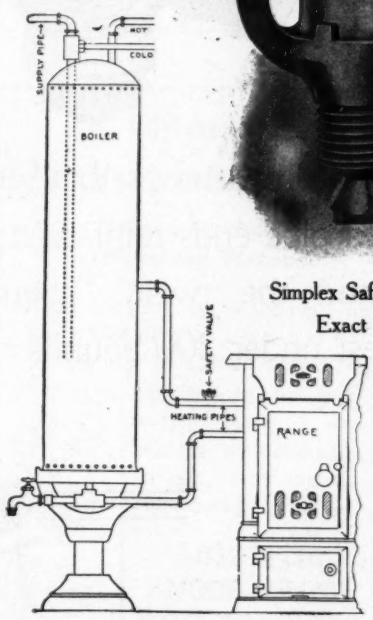


OF MECHANICAL SUBJECTS A SPECIALTY WE GUARANTEE THE BEST QUALITY OF WORK BUYABLE FOR THE LEAST MONEY SEND FOR ESTIMATES ON HIGH CLASS PROCESS ENGRAVING, STEEL DIE STAMPING & EMBOSSING

CLARK ENGRAVING & PRINTING CO.
MILWAUKEE, WISCONSIN.

Striking illustration, printed in three colors, mounted on heavy board and arranged with easel back for counter display, furnished free with one dozen safety-valves.

Simplex Safety-Valve
Exact size.



Plumbers wanted everywhere to act as our agents.

Kitchen range and hot water system, showing place to attach valve.

Write us today for booklet

THE SIMPLEX MFG. CO.

140 Nassau St., : : : : : New York, N. Y.
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"Total Eclipse" Hydrants and Street Washers are Standard

ASK your jobber. They have gotten beyond the experimental, pattern-changing stage. They are the standard goods carried by all jobbers. They give absolute satisfaction in every respect by virtue of our unceasing efforts to preserve their reputation for high quality and efficiency. Their construction is such as to make them practically impossible of freezing, an important feature, as you know. **Send for our catalogue to-day.**

John C. Kupferle

ST. LOUIS, MO.

Established 50 years. Headquarters for Cess Pools, Boiler Stands, Etc.

NOXALL Jr.

GERM PROOF

FILTERS

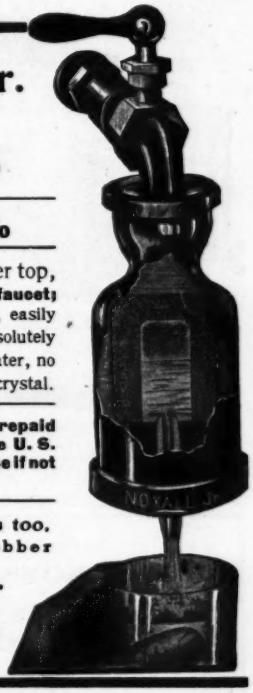
RETAIL FOR $2.50
Costs the Dealer $1.50

made with screw or rubber top, **to fit a hose bibb or plain faucet;** well made, beautifully finished, easily attached, easily cleaned, absolutely germ proof and makes any water, no matter how dirty, as clear as crystal.

We will send a sample by prepaid express to any dealer in the U. S. to be returned at our expense if not satisfactory.

We make bigger filters too.
We Do Not Sell The Jobber

American Filter Co.
508 Noxall Bldg.
MILWAUKEE, WIS



The Simple, Sanitary, Modern and Efficient Sturm Cellar Drain

This clever device has been used by hundreds of master plumbers who want an efficient cellar drain at a reasonable price. Unscrew the plug to allow water to flow off; screw it in to prevent entrance of back water or sewer gas.

Write it in the Specifications

Fries & Company

89-93 Main Street, Buffalo, N. Y.

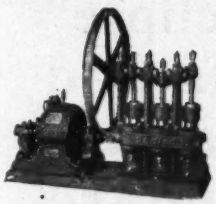
HOT! HOT! HOT! HOTTEST ON EARTH

If everybody knew everything the demand for our Torches would be greater. There is no Red Tape about buying the right Torch. The Turner No. 12 is known widely as the "Old Reliable" best quality heavy brass, highest grade single jet type of torch made; and the price is small. We will fill your orders promptly. Just the thing for thawing out frozen pipes in the winter.

The Turner No. 12. Price each $3.25

TURNER BRASS WORKS
43 N. Franklin St., CHICAGO

PUMPING PROBLEMS



Electric Triplex Pump, designed for use in Apartment Houses, Office Buildings, etc.

DOMESTIC ENGINEERS
and others interested in pumping, problems should write for our
CATALOGUE "G"
illustrating our complete line of Single and Double Acting Triplex Power Pumps and Deep Well Working Heads and containing many valuable engineering rules and tables.

The Deming Co. Salem, O.
Manufacturers of
HAND and POWER PUMPS for all purposes.
HENION & HUBBELL
General Western Agents
61-69 N. Jefferson Street CHICAGO

Send 12c in stamps for a sample 2-in. or 20c stamps for 4-in. hanger

STEEL PIPE HANGERS

Can be Cut to all Desired Lengths by Disconnecting the Two Lower Screws

SIZE OF PIPE	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
Adjustable Length 2 to 10 each	.18	.18	.18	.20	.22	.25	.30	.35	.37	.45			
Adjustable Length 10 to 16 each	.21	.21	.21	.23	.25	.28	.33	.38	.40	.48			
Adjustable Length 16 to 22 each	.24	.24	.24	.26	.28	.31	.36	.41	.48	.51			

THE REYNOLDS HEATER CO. WARSAW, INDIANA
35 DEARBORN ST., CHICAGO

NOW READY!

DIRECTORY for 1907

14th Year

(Part I is the same size as it has been for years, 6⅞x3⅞ inches, leather bound, and contains 1,116 pages.)

Part I contains

1. Directory of Legitimate Jobbers of Plumbing Supplies in United States and Canada.
2. Directory of Jobbers of Heating Supplies in United States and Canada.
3. Directory of Dealers in Mill Supplies in United States.
4. Directory of Water Works in United States.
5. Directory of Gas Companies in United States.
6. Directory of Architects in United States and Canada.
7. Directory of Sanitary Engineers in United States.
8. Directory of Consulting Engineers in United States.
9. Directory of Mechanical Engineers in United States.
10. Directory of Manufacturers of Plumbing, Heating and Mill Supplies in United States, classified (1) alphabetically, and (2) under the heads of such articles as they make, giving each special trade name or brand by which their goods are known. An indispensable aid to the busy buyer.

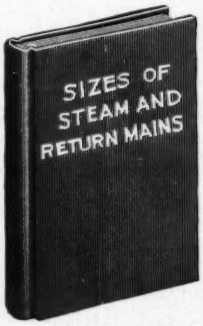
Part II

is 11¼x8 inches and is now published for the first time. It illustrates and describes trade specialties.

Price for both parts, delivered, $5.00

DOMESTIC ENGINEERING
58-64 N. Jefferson Street Chicago, Illinois

Sizes of Flow and Return Steam Mains



Being an apprentice's query as to correct sizes of pipes in heating plants, and answers thereto by twenty-five leading American heating engineers. These replies, giving the practice in some of the leading shops in many different cities of the country, with tables and diagrams, are by the following engineers:

Prof. R. C. Carpenter, Cornell University
Prof. J. H. Kinealy, St. Louis
John Gormly, Philadelphia
Ralph Collamore, Detroit
Gerard W. Stanton, New York
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Clarence M. Lyman, Utica, N. Y.
R. R. M. Carpenter, Wilmington, Del.
E. F. Capron, Chicago
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Bernard Gause, Jacksonville, Ill.
J. J. Wilson, Philadelphia
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Reginald Pelham Bolton, New York
F. R. Still, Detroit
Thomas Morrin, San Francisco
James A. Donnelly, New York, and others.

Bound in Boards, 6¼ x 4¼ inches Price 50 cents, delivered

DOMESTIC ENGINEERING
49-53 N. Jefferson Street, Chicago

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"Never-Leak-Tank-Lining"

F. & K.'s "Never-Leak-Tank-Lining" is the result of fifteen years of keeping a little ahead of all competitors. Just consider some of our "claims":

Each complete "Never-Leak-Tank-Lining" is perfect. No water such as used for domestic purposes will attack it no matter how much acid, alkali or other corrosive ingredient contained. It is absolutely proof against electrolysis. It positively will not "sweat". It will last indefinitely where no metal lining stood three months. It fits the tank perfectly.

THE PRICE IS NO HIGHER THAN HEAVY LEAD OR COPPER. Ever try it? One installation will make you its friend for life.

Ask your jobber for particulars

Findeisen & Kropf Manufacturing Company

High Grade Plumbers' Woodwork

Twenty-first Place and Rockwell Street, CHICAGO, ILL.

MALLEABLE IRON FITTINGS

Beaded ¼" to 6"
Malleable Fittings from Cast Iron Pattern ⅛" to 16"

FOR

Quick Shipments

Send Your Orders To

Plain ⅛" to 2" inclusive
Malleable Drainage Fittings

THE KELLY & JONES CO.

WORKS—GREENSBURG, PA.

NEW YORK PITTSBURG ST. LOUIS DENVER
CHICAGO SAN FRANCISCO

City Delivery & Shipping Dept.
Telephone 2302 Main

Main Office
Telephone 4172 Main

Thomas G. Knight Co.

Plumbers' Steam &
Gas Fitters' Supplies

WAREHOUSES:
364 Jay Street
50 & 52 Myrtle Avenue
359 Pearl Street

Office:
359 Pearl Street,
BROOKLYN, N. Y.

Excelsior Grease Trap

Well and favorably known; two sizes for hotels and restaurants and residences. Get list price and trade discounts.

SPROUL & McGURRIN
GRAND RAPIDS, MICHIGAN, U. S. A.

DENNEY RIDER ENGINE

DENNEY IMPROVED
Rider & Ericsson
HOT AIR PUMPING ENGINES

The most Reliable and Economical Engines for pumping water. Use any kind of fuel. Can be operated by any one. Perfectly safe, Noiseless, and Always ready for service. Important Improvements Patented and NOT FOUND in any OTHER MAKE of engines. Send for catalogue and testimonial list.

Built for years by
American Machine Co.
Wilmington, Del.

THERMO VALVE

BRASS FITTINGS,
UNIONS, NIPPLES
And SPECIALTIES

Acheson Manufacturing Co.
RANKIN, PA.

THE FROST MFG. CO.
PLUMBERS BRASS GOODS.

C. N. HOOPER, Dubuque, Ia.

VITREOUS ENAMELING
TECHNOLOGIST

Designs, builds and starts new plants. Improves quality and reduces the costs in those already established.

JOHN C. KING & COMPANY
"THE ROOKERY" CHICAGO

Members: NEW YORK STOCK EXCHANGE
CHICAGO STOCK EXCHANGE
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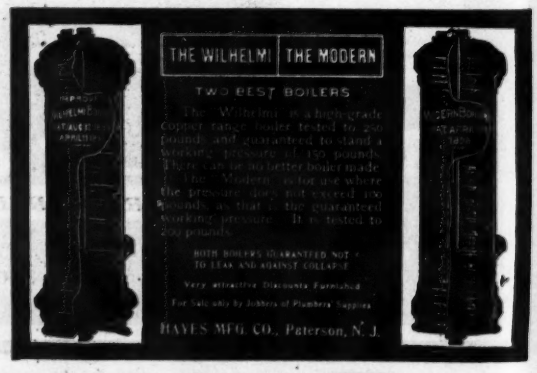
Make a Specialty of Unlisted Securities.

NEW YORK OFFICE
7 WALL STREET



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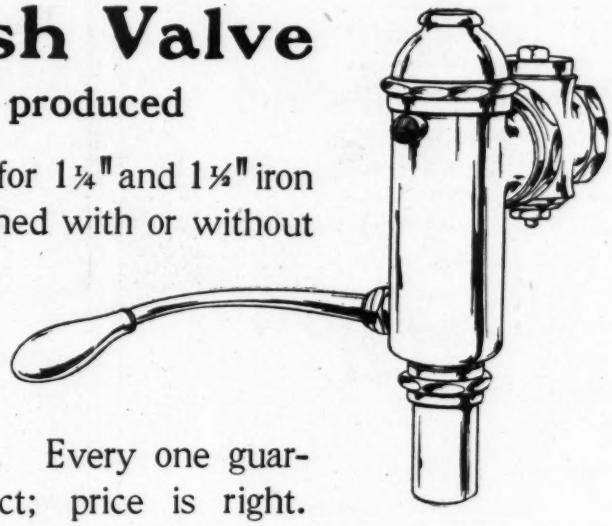
Novio Flush Valve

The Best yet produced



Closet flush valve made for 1¼" and 1½" iron pipe connections. Furnished with or without controlling cock. Easily adjusted for high or low pressure, and for volume of water required. Made for fresh and salt water. Every one guaranteed; quality is correct; price is right.

JENKINS MANUFACTURING COMPANY

SOLE MANUFACTURERS.

FACTORY AND GENERAL OFFICES.
BLOOMFIELD, N. J.

SALES OFFICE
13-21 PARK ROW, NEW YORK CITY

Think what this Means

During the entire period covered by the patent **The Murdock Hydrants** and **Street Washers** were never improved upon. We still make the **genuine,** the original **Murdock Hydrants and Street Washers,** and we **make them in the same old way.** When ordering insist that Hydrants and Street Washers bear the full name **"Murdock"**, as otherwise you will not get the **Genuine.**

The Murdock Mfg. & Supply Co.

PLUMBING, GAS AND STEAM SUPPLIES

Cincinnati, Ohio

PROPRIETORS OF
AMERICAN BRASS WORKS
GENERAL BRASS FOUNDERS AND MANUFACTURERS OF PLUMBERS' SPECIALTIES

EASTERN AGENT
THOS. H. HUTCHINSON
101 BEEKMAN ST.
NEW YORK

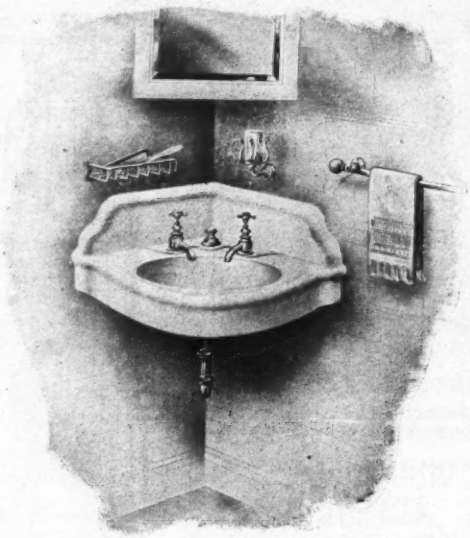


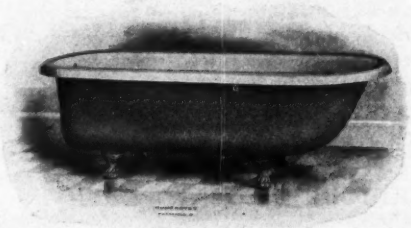
Plate 14-A

SESCO VITREOUS CHINA CORNER LAVATORY

For Prices and styles write

THE SANITARY EARTHENWARE SPECIALTY CO.,
Trenton, N. J.

Humphryes' Mayflower



Is a bath tub that will please the most particular customer

GRACEFUL IN DESIGN
PERFECT IN FINISH

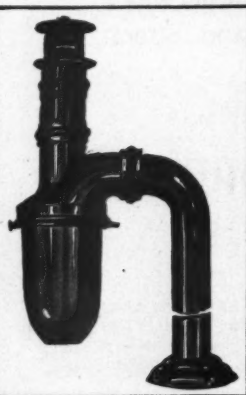
Wide, flat bottom, large bathing space. Heavy, flat-topped roll rim.

FULLY GUARANTEED

The Humphryes Mfg. Co., Mansfield, O.

N. Y. Office and Warehouse: 636-638 W. 34th Street.

Lawler's American Sanitary Plumbing.— A practical work on the best methods of Modern Plumbing, illustrating with original sketches the fundamental principles of everything the Plumber should know. By Jas. J. Lawler. $2.00 prepaid. DOMESTIC ENGINEERING, 58-64 North Jefferson Street, Chicago, Illinois.



BOWER TRAPS

IMPROVED

are now manufactured exclusively by

THE MONARCH BRASS CO.

CLEVELAND, OHIO

AT A GREAT REDUCTION FROM FORMER PRICES

Send for catalogue and revised discounts.

HIGH CLASS GROUND KEY—COMPRESSION AND FULLER WORK
SOLDER NIPPLES AND UNIONS

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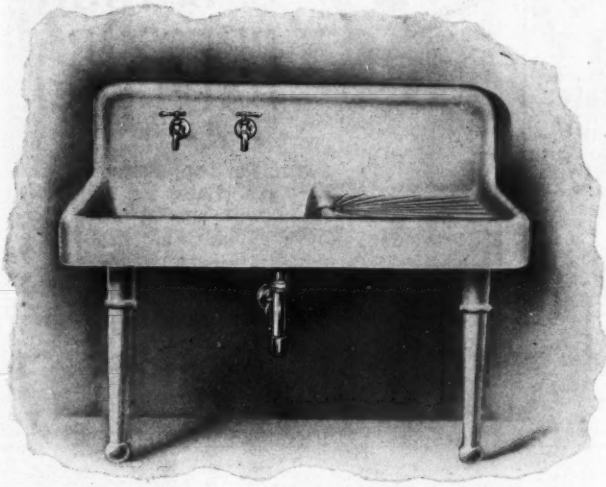


PLATE C-92 "TENNESSEE" SINK
(Patent applied for)

"THE CRY IS,
Still They Come"

That means new designs from The Cahill people. We show for the first time our new "Tennessee" sink, size 20x30 in., back 12 in., apron 5 in., drain board 20x24 in., all cast in one piece. Drain board depressed 2½ in., length over all 52 in. Supported by wall hangers and enameled legs.

WRITE FOR CUTS, PRICE LIST AND FULL DESCRIPTION

THE CAHILL IRON WORKS
CHATTANOOGA, TENN.

NEW YORK OFFICE AND SALES ROOMS, 101 BEEKMAN STREET, THOS. H. HUTCHINSON, MANAGER

Kohler's Superior

Porcelain Enameled Iron "Colonial" Pattern Lavatory.

Slab, Basin and Apron Cast in "One Piece"

All over enameled on Square Pedestal and fitted with N. P. Brass "Superior" Fuller Faucets with "H. & C." Handles, Secret Waste with China Index, "Bottle" Trap with Vent to Wall and Straight Supply Pipes to Wall.

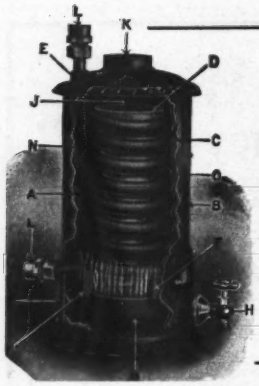
DIMENSIONS

Square Slab.....20x24"
Oval Basin.....12x15"
Plate K 141 P List complete as described.....$41.50

The "Colonial"

J. M. KOHLER SONS CO.
SHEBOYGAN, WISCONSIN

New York, 48 Cliff Street Chicago, 19-23 North Clark Street
Oakland, 1127 Fifth Avenue

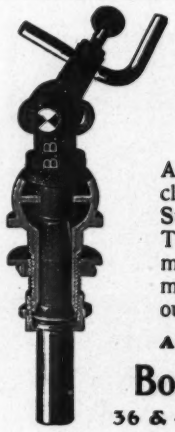


Lawson Improved Gas Water Heater

Is the most economical and up-to-date device on the market for furnishing hot water for household purposes. Send for booklet, giving full description.

Lawson Mfg. Co.
HOMESTEAD, PA.

Any advertiser in "Domestic Engineering" is at liberty to examine its paid subscription list at any time.



B. B. HIGH PRESSURE BALL COCK

All sizes ½ inch to 3 inch inclusive for Top, Bottom or End Supply and also for low Down Tanks with special float. Removable seat of best steam metal. Floats stamped with our B.B. thoroughly guaranteed.

ASK YOUR JOBBER FOR THEM.

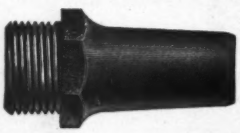
Boston Brass Company,
36 & 40 Oliver Street, Boston, Mass.

Lausten Lead Works

PRATT AND MORGAN STREETS, CHICAGO

WRITE FOR PRICES

Bi-metallic Specialties, Lead Traps and Bends, Lead Pipe, Sheet Lead, Ebony Gloss Plumbers' Soil.

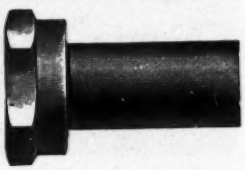


WHEN IN THE MARKET FOR

Solder Nipples and Unions

GET OUR PRICES

Our goods are guaranteed to give entire satisfaction.



Copy of Catalogue A and Discount Tables sent you on request.

ERIE, PA. **J. B. CAMPBELL BRASS WORKS,** ERIE, PA.

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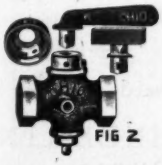
What Would You Think?

If a commander in time of war, being responsible for the safety of a castle, after barricading the windows, were to leave the gates unlocked and unguarded. Ought to be court-martialed and shot, eh ? Of course he should. Well, now Mr. Plumber, isn't a man's home his castle, and isn't there a constant warfare going on against the insidious foe of sewer gas, and hasn't he made you responsible for the safety of his home, against the invasion of this powerful enemy, and haven't you barricaded all the smaller possible entrances by putting in extra heavy cast iron sewer, solid plug clean-outs and honeycombing his partitions with vent pipes, and testing it all with water test, and then when you have come to the main entrance, the fixture trap you have utterly failed, and the enemy has found easy access because you put in a trap with secret partitions, no scouring action and no anti-syphonic construction. Well, now we don't want you to be shot, because there is a scarcity of good plumbers, but we do want you to use only

Patent Pending

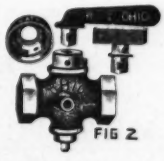
Radcliffe's "Positive" Anti-Syphon Trap

Ask your jobber to show you one



The Ohio Brass & Iron Mfg. Co.

CLEVELAND, OHIO



MAKERS OF THE WELL KNOWN RELIABLE OHIO STOP AND WASTE COCKS

ONE very good reason and a reasonable reason is that **CLEAN SWEEP TRAPS** have the merits of being the best sanitary traps made. They are used by the Government, and are made in Brass and Lead.

Your Jobbers Have Them

DETROIT SANITARY SUPPLY CO.

Sole Manufacturers

27-29 Jefferson Avenue, Detroit, Michigan.

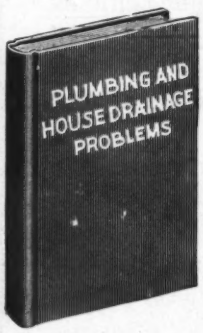
THE NO. 32 TORCH

is the best combination quart size torch ever made. It uses but little gasoline and produces a blue blast flame that is intensely hot. We know it will please any mechanic and will save him time and money. A careful examination will convince you that you never saw a torch to equal the No. 32. Try one. Jobbers sell at factory price, or we will ship direct if cash accompanies the order.

CLAYTON & LAMBERT MFG. CO., Detroit, Mich., U.S.A.

GOOD advertising is nothing more or less than the talk of a good, first-class salesman, not to one individual, but to each individual of a mass. One kind of salesman takes his time to carefully detail the merits of the goods he has to sell and makes his talk verbally to one customer, while the same amount of energy, thought, salesman ability and convincing argument would win perhaps a thousand people if told through the columns of the newspapers.—C. W. Post, in "Fame".

Plumbing and House Drainage Problems



A selection of articles for practical plumbers. Sixth edition. Designed to give ready reference and assistance to plumbers confronted with problems with which they have had no previous experience. A fund of valuable information on practical subjects.

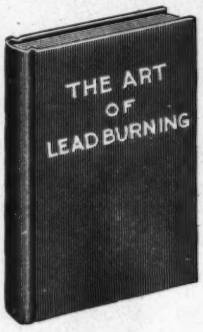
CONTENTS: Dangerous blunders in plumbing. House drainage and cesspools. Fresh air inlets. Soil, waste and vent pipes and traps. Water closets and House fixtures. Siphons and siphonic effect. Water supply and service pipes. Tanks, filters and cisterns. Boilers, water-backs and hot water service piping. Exclusive hot water supply systems.

Price $2.00, delivered

DOMESTIC ENGINEERING
CHICAGO, ILLINOIS

THE ART OF LEAD BURNING

By C. H. FAY



For the first time the process of lead burning is given a detailed description by an expert. By following the author's directions beginners, as well as those more experienced, can acquire a mastery of this profitable art.

Bound in cloth, 8x5½ in.; 144 pp.
52 illustrations.

CONTENTS: The apparatus; Hydrogen gas; The construction of the generator; Making the gas to burn the generator; Connecting the apparatus; Charging the apparatus; The flame and its management; The different kinds of seams; Pipe seams; Acid chamber work; Special hydrogen apparatus and burner; Soft soldering with the mouth blow pipe.

Price $2.00, delivered

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CHICAGO, ILLINOIS

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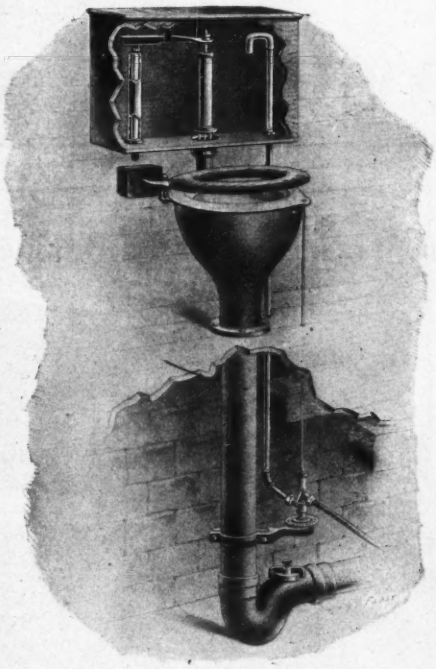
consists of exploiting **goods of merit,** the **measure of merit** is **in the guarantee. Our guarantee always is "Absolute satisfaction or money back".**

THE ARCTIC



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A TIME MONEY SAVER

Successful results can only be obtained by pleased customers and **repeated orders.** This is the reason why we so persistently call your attention to our goods, knowing that if we can only serve you once, we will hear from you often.

Low Down Frost Combination.
The Best is Always the Cheapest

FLECK BROS. CO.

PHILADELPHIA, PA.

PROTECTOR

The "PROTECTOR" Non-Syphoning Trap is the best of its type. It is highly recommended by sanitary engineers, being so constructed as to effectually prevent the passage of any air or gas from the waste pipe into the building.

There is no need of a vent pipe. Back venting hastens evaporation and oscillation.

A 1½-inch Trap with a 2-inch seal of water, when vented, evaporates in 14 days. An unvented Trap takes 60 days to evaporate, with the same seal.

The water in the "PROTECTOR" Trap is driven through the body by hydraulic and atmospheric pressure, instead of being pulled through by suction.

ADVANTAGES.

It is self-cleaning.

It has a 3½-inch Seal of Water, which is retained at all times.

Fig. L-2820

Fig. L-2821

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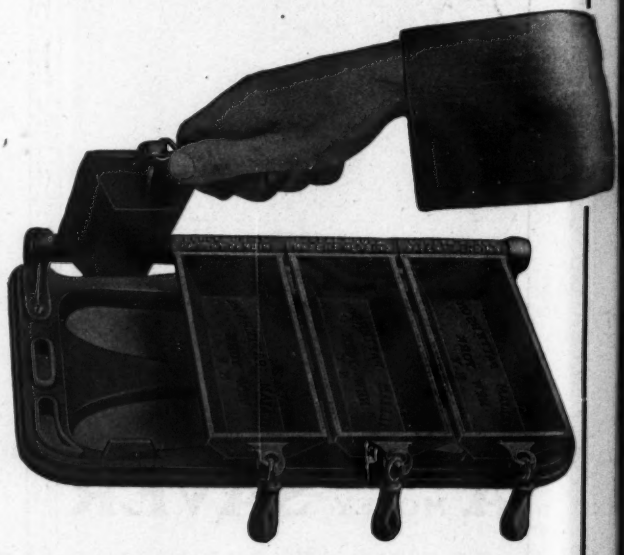
If plumbing is YOUR business, that "It" is the EUREKA MOULD. You can see at a glance how it is operated, and you can also see how your old lead etc., would look moulded into well-shaped bars bearing your name, and that of your city and state, in raised letters. You could then tell how much you had on hand; it would be in convenient form to send to job, and anyone would think twice before ABDUCTING stock that bore owner's name. HOLD THIS AD. before a mirror and read name in bottom of mould. Plumbers with progressive ideas are purchasing these moulds, and you will show that you have an eye for system in YOUR shop by doing the same. Just send us your order, giving NAME, CITY and STATE, and you will receive mould EXACTLY LIKE CUT. "ON THE FENCE"? Just to satisfy yourself send for folder. It is wet reading.



Address THE EUREKA MOULD, Medford, Mass.

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And Soil Pipe Fittings

FRANKLIN PIPE & FOUNDRY CO.

1155 S. PAULINA STREET, - - CHICAGO, ILL.

"THE CAST SINK MUST GO"

"Columbus" & "New Era"

WROUGHT STEEL SINKS

Rolled Rim and Flat Edges. Painted, Galvanized, Blue Enameled, Grey Enameled, White Enameled.

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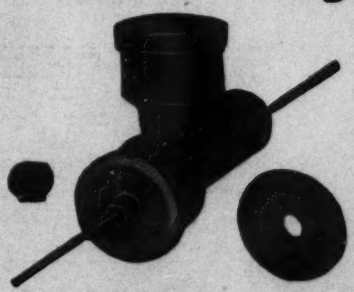
The "CAMPBELL"

(PATENTED)

Clean-Out Fitting

Why be behind the times when you can be up-to-date by using "CAMPBELL" CLEAN-OUT FITTINGS, the special features of which will interest you. They are



***A*—trap screw clean-out**
***A*—continuous soil pipe fitting**
***A*—test plug, and drain connection—**
—Combined in the one fitting.

The above cut illustrates the "Campbell" fitting, with finishing plate and cap removed for cleaning obstruction without disturbing Trap-screw. Made in one-eighth bends, Y's, Tees, and combination Y and one-eighth bends with trap-screw tapped in run, or branch. Ask your jobber. He keeps them, or write for catalogue to

Campbell Mfg. & Supply Co.
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"The Goods That Please"

Est. 1869 Inc. 1898

HAYS

Brass and Iron Fittings

for Plumbing, Water, Gas and Steam

Will Not Disappoint

Hays Mfg. Co.

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Vitrified, Silicate and Elastic Corundum Wheel

Send for new catalogue — **STAR CORUNDUM WHEEL CO. Ltd., Detroit, Mich**

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KELSEY HEATING

Perhaps you think the claims made for the efficiency of the

KELSEY WARM AIR GENERATOR

are all theory. It's a fact however, that Kelseys have been installed in thousands of the finest class of Residences, Churches and Schools, where hot air furnaces have not been considered, and in many cases, in preference to any Steam or Hot Water System. They are giving the kind of results too, which bring Kelsey Dealers more business. **28,000 IN USE.**

WHY NOT SEND FOR OUR AGENCY PROPOSITION—NOW?

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New York Office: 156 Fifth Ave. Chicago: 38 Lake St.

The Mark Found Only On Good Goods

Like all "Canfield" goods the basin and bath tub waste washers are made of best grade of rubber, designed for longest wear. Always ask your jobber for "Canfield's".

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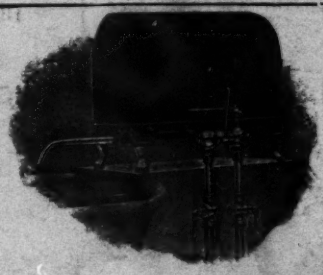

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Instantaneous

Water Heater

Sold only to the trade. Send for catalogue and discounts.

Manufactured by **Adam's Steel & Wire Works,**

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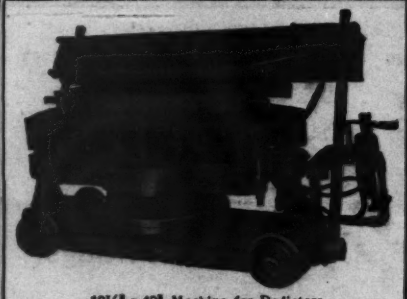

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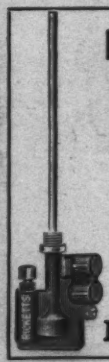

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This has a *Mercury Seal*, which means *absolutely positive* cut off. No valve seats, no springs, no expansion rod to strain, *simply mercury*. Lasts forever, *impossible* for mercury to get away.

Unconditionally Guaranteed

Give us an order and prove it, also send for description.

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